HITACHI

Model V-1050

Oscilloscope

SERVICE MANUAL

File: H27

Hitachi Denshi, Ltd.

TOKYO, JAPAN

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1. SPECIFICATIONS

o CRT

Type

Hitachi 150BNB31 rectangular mesh type tube with 20 KV acceleration potential and metal backed phosphor

Screen type

P31 phosphor standard

Useful screen area

8 × 10 div (div = 10mm)

Graticule

Internal graticule with centimeter divisions and 2mm subdivisions along the centeral axis 10% and 90% lines are indicated. Illumination continuously variable.

Focussing

Possible (with automatic focus correction circuit)

Trace rotation	Present
Scale illumination	Variable
Brightness adjustment	Possible

o Z-AXIS

DC-coupled, positive-going signal decreases intensity: 5Vp-p signal causes noticeable modulation at normal intensity: DC to 3.5MHz.

Input impedance	Approximately 15 k ohm
Maximum input voltage	20 V (DC + AC peak)
Coupling	DC

o VERTICAL DEFLECTION (2 Identical Channels)

Bandwidth and Rise time

DC to at least 100MHz and rise time 3.5ns or less. DC to

at least 5MHz and rise time 70ns or less at magnifier extends. Lower -3dB point, AC coupling 10Hz or less.

Deflection Factor

5mV/div to 5V/div in 10 calibrated steps, 1-2-5 sequence. Uncalibrated continuous control extends deflection factor to at least 12.5 Volts per division in the 5 Volts/div position. ×10 magnifier increases sensitivity of each deflection factor setting to 500 μV/div.

Accuracy

±2% (+10°C to +35°C)

±4% (0°C to +50°C)

Additional error for magnifier ±1%

Display modes

CH1, CH2 (normal or invert), Alternate, Chopped (250kHz rate), Added

Input Impedance

1M ohm ±1.5% in parallel with 28pF ± 3pF.

Maximum Input Voltage

250V (DC + AC peak) or 500Vp-p AC at 1KHz or less

Input coupling

AC-GND-DC

Delay Line

Permits viewing leading edge of display waveform.

Four-trace Display (TRIG VIEW)

Display simultaneously channel 1, Channel 2, Channel 3 (A EXT TRIG signal), Channel 4 (B EXT TRIG signal). The deflection factor of Channel 3 and Channel 4 is approximately 200 mV/div.

Sensitivity	INT:	1/1 ± 30% of screen area
	EXT:	0.2 V/div ± 30%
Frequency band	EXT:	DC to 70 MHz (-3dB)
Position	CH3:	Horizontal 100% graticule line of screen ± 1div (trigger level knob is set at the center).
	CH4:	Horizontal 0% graticule line of screen ± 1div.

o HORIZONTAL DEFLECTION

Time Base A

20ns/div to 0.5s/div in 23 calibrated steps, 1-2-5 sequence. Uncalibrated continuous control extends deflection factor to at least 1.25 seconds per division in the 0.5 sec/div position. x10 mag extends fastest sweep rate to 2ns/div.

Time Base B

20ns/div to 50ms/div in 20 calibrated steps 1-2-5 sequence. x10 mag extends fastest sweep rate to 2ns/div.

Accuracy

±2% (+10°C to +35°C)
±4% (0°C to +50°C)
Additional error for magnifier ±2%

Horizontal Display Modes

A only, A intensified, Alternate, B delayed, X-Y operation.

Delayed sweep position adjustment	1 div or less ~ 10 div or more
Delay sweep variable	Present
Delay Time Jitter	Better than 1:20,000

o TRIGGERING A AND B

A Trigger Modes

Automatic, Normal, Single sweep, TV (TV-H or TV-V)

A Trigger Hold-off
Adjustable control permits a stable presentation of repetitive complex waveform.

A Trigger Source
Internal (Ch1, Ch2), Line, External, External ÷10

A Trigger Slope
+ or -

TV Sync Polarity
TV(+) or TV (-)

Triggering level variable range: For both A and B. Internal; ±4div or more
External; approximately ±1V
External ÷10; approximately ±10V

Triggering sensitivity and frequency: For both A and B. However, ( ) is only for B

Frequency	Internal	External	External ÷10
DC(30Hz) ~ 10MHz	0.3 div	50 mV	500 mV
10 MHz ~ 100MHz	1.5 div	150 mV	1.5 V

TV-V sensitivity: SYNC section less than 0.7div or 200mV
AUTO low band : Approximately 30Hz (When Time Base A is 20ns/div to 2ms/div)

A Trigger Coupling
AC : 30Hz to full bandwidth
HF REJ: attenuates signals below approximately 4KHz
LF REJ: attenuates signals above approximately 4KHz
DC : 0 to full bandwidth

A External Trigger Input Impedance
1M ohm ±20% in parallel with 28pF ±6pF (However, setting HF REJ and LF REJ are not included.)

Maximum Input Voltage
250V (DC + AC peak)
500Vp-p AC at 1KHz or less

B Trigger Modes and Source
Automatic, Normal (Ch1, Ch2, External)

B Trigger Slope
+ or -

Trigger Coupling
AC only; 30Hz to full bandwidth

o X-Y OPERATION (CH1; Horiz, CH2; Vert)

Deflection Factor
Same as vertical deflection

Accuracy
Y: ±2% (+10°C to +35°C), ±4% (0°C to +50°C)
X: ±5% (+10°C to +35°C), ±7% (0°C to +50°C)
Additional error for magnifier ±2%

X-Bandwidth
DC to at least 2MHz

Phase Error
3° or less from DC to 2MHz

o CALIBRATOR

0.5V±1% Frequency 1kHz±1% square wave

Rise time 5μs or less

o OUTPUT SIGNALS

A GATE OUT TTL OUTPUT (74LS00 with OUTPUT series resistance 100Ω)

B GATE OUT TTL OUTPUT (7400 with OUTPUT series resistance 100Ω)

o POWER SUPPLY

VOLTAGE (50/60Hz)	FUSE
100 V (90 ~ 110 V)	2A
120 V (108 ~ 132 V)	2A
220 V (198 ~ 242 V)	1A
240 V (216 ~ 264 V)	1A

Nominal voltage ± 5% at 400Hz

Power supply frequency : 50, 60, 400Hz

Power consumption : Approximately 60W

o ENVIRONMENT

Limit of operation temperature	0°C ~ 50°C
Limit of operation humidity	35% ~ 85%
Rated range of use temperature	10°C ~ 35°C
Rated range of use humidity	45% ~ 85%
Strage and transport	-20°C ~ 70°C

o DIMENSION AND WEIGHT

310w × 180h × 410d mm
(12.2w × 7.1h × 16.1d in)
10.2kg (22.5 lbs)

2. COMPOSITION

(1) Model V-1050 oscilloscope unit..... 1

(2) Probe (AT-10AE 1.5)..... 2

(3) Fuse (2A for 100V and 120V set
or 1A for 220V and 240V set)..... 1

(4) Screw-driver..... 1

(5) Dust proof cover..... 1

(6) Power supply cord..... 1

(7) Operation Manual..... 1

3. PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the oscilloscope. The severity of environment to which this instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration of the instrument.

Disassembly

Remove the 4 screws in the top cover of the instrument. Gently separate the top cover from the instrument and lay aside. Most of the internal parts of the instrument are now accessible.

If access to the front of the circuit boards are necessary, remove the knobs from the external control shafts on the board. Remove the two screws securing the side panel to the Input circuit board and remove the instrument side panel. (See 5. DISASSEMBLY ILLUSTRATION.)

Cleaning

The instrument should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause component breakdown.

The covers provide protection against dust in the interior of the instrument. Loose dust accumulated on these covers can be removed with a soft cloth or small brush.

Dirt that remains can be removed with a soft cloth depended in a mild detergent and water solution. Abrasive cleaners should not be used.

Cleaning the interior should only be occasionally necessary. The best way to clean the interior is to blow off the dust with a dry, low-velocity stream of air. A soft-bristle brush or a cotton-tipped applicator is useful for cleaning in narrow spaces or for cleaning more delicate components.

Visual Inspection

The instrument should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is apparent; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, correcting the cause of the overheating is important to prevent recurrance of the damage.

4. CALIBRATION.

Hitachi Denshi, Ltd. provides complete instrument repair and recalibration at our oversea's office, and authorized dealer. Contact your local Hitach Denshi, Ltd. office or representative.

4.1 CALIBRATION INTERVAL

To maintain instrument accuracy, perform the calibration of the V-1050 at least every 1000 hours of operations or every six month if used infrequently.

4.2 TEST EQUIPMENT REQUIRED

The following test equipment and accessories, or equivalent, are required for the complete calibration of the V-1050. The given specifications for the test equipment are the minimum necessary for accurate calibration. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications. All the test equipment is assumed to be correctly calibrated and operating within the listed specification. Operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

4.3 PRELIMINARY PROCEDURE

This instrument should be calibrated at an ambient temperature of +20°C (±5°C) for best overall accuracy.

1. Connect the instrument to AC line voltage, 50/60/400 Hz line source.
2. Set the instrument controls as given in the Preliminary Control Settings. Allow at least fifteen minutes of warmup before proceeding.
3. See the Adjustment Locations in the pullout pages.

Table 4-1

TEST EQUIPMENT REQUIRED

Description	Minimum Specification	Usage	Examples of Applicable Test Equipment
1. Constant Amplitude Signal Generator	50kHz reference frequency; maximum frequency 150MHz; variable amplitude.	Check horizontal, vertical and trigger bandwidth.	
2. Standard Amplitude Calibrator	Amplitude accuracy: 0.25%, variable amplitude; 5mV to 40 V; frequency: 1 kHz square wave.	Check horizontal and Vertical gain.	
3. Square-wave Generator	Variable frequency: 10 Hz to 1 MHz; output amplitude; 10 mV to 100 V.	Check probe and vertical compensation.	
4. Digital Multimeter	0.1% accuracy.	Check power supply.	
5. Digital Frequency Counter	0.1% accuracy.	Check CAL frequency.	
6. Time Mark Generator	0.1% accuracy .	Check horizontal timing.	
7. Cable	Impedance, 50 ohms; type, RG-58/U; length, 42 inches, connectors, BNC	External trigger operation check. Horizontal gain check and adjustment.	Hitachi Part No.4202
8. Termination	Impedance, 50 ohms; connectors, BNC	Vertical Amplifier compensation checks and adjustment.	
9. Attenuator	Ratio, 10X; connectors, BNC; impedance, 50 ohms.	Vertical Amplifier bandwidth check.	
10. T-Connector	Connectors, BNC.	External trigger operation checks.	Hitachi Part No.1301

4.4 PRELIMINARY CONTROL SETTINGS

Preset the instrument controls to the settings given below, when starting the calibration procedures.

FOCUS	Midrange	FINE	Midrange
TRACE ROTATION	As desired	VAR HOLD OFF	Fully counterclockwise
V. POSITION	Midrange, push in	SWP VAR	Fully clockwise, push in
V. VARIABLE	CAL, fully clockwise	DISPLAY	A
AC-GND-DC	GND		-B TRIG-
VOLTS/DIV	5mV/DIV	SOURCE	AUTO
V. MODE	CH1	LEVEL	Midrange, push in
TRIG VIEW	Normal (Button Out)		-A TRIG -
INV	Normal (Button Out)	LEVEL	Midrange, push in
SCALE ILLUM	Fully counterclockwise	RESET	Normal
H. POSITION	Midrange	MODE	Auto
PULL X10 MAG	Midrange, push in	COUPLING	AC
TIME/DIV A	1mS	SOURCE	CH1
DLY TIME MULT	Midrange		

4.5 INITIAL STARTING PROCEDURE

1. Rotate POWER/INTENSITY control to the midrange.
2. Wait a few seconds for the cathode ray tube (CRT) to warm up. A trace should appear on the display of the CRT.
3. If trace disappears, increase (clockwise) the POWER/INTENSITY control setting until the trace is easily observed, or roughly check/adjust the DC balance to get a trace as same as (15) .
4. Adjust FOCUS control for the best focused display.
5. Readjust POSITION controls if necessary, to center the trace.

POWER SUPPLY SYSTEM

NOTE

Before you begin, see ADJUSTMENT LOCATIONS in the pullout pages.

Control Settings

Preset the controls as given in the Preliminary Control Setting.

(1) Check Low-voltage Supply, if necessary

a. Connect the digital voltmeter (DVM) from the +12 volt line.
: +11.975 V to +12.025 V (P1104-3)

b. Connect the DVM from the -12 V line
: -11.75 V to -12.25 V (P1104-5)

c. Connect the DVM from the +5V line
: +4.75 V to +5.25 V (P1104-4)

d. Connect the DVM from the +55 V
: +53 V to 57 V (P1104-2)

e. Connect the DVM from the 100 V
: +98 V to +102 V (P1104-1)

(2) Adjust Low-voltage Supply

Adjust the adjustment RV1112 for DVM reading of +12V ($\pm$0.025V).

(3) Check High Voltage Supply

a. Connect the DVM to the H.V test point (PEF-503-2) by High Voltage Probe.

b. Check for a reading of -1870 V ~ -2030 V

Control Setting

Preset the controls as given in the Preliminary Control Setting.

④ Check/Adjust CRT Bias

DISPLAY switch to the [A] position, and A TIME/DIV switch to the 1 ms.

a. Rotate the POWER/INTENSITY to the "N" letter of the "INTENSITY" as shown.

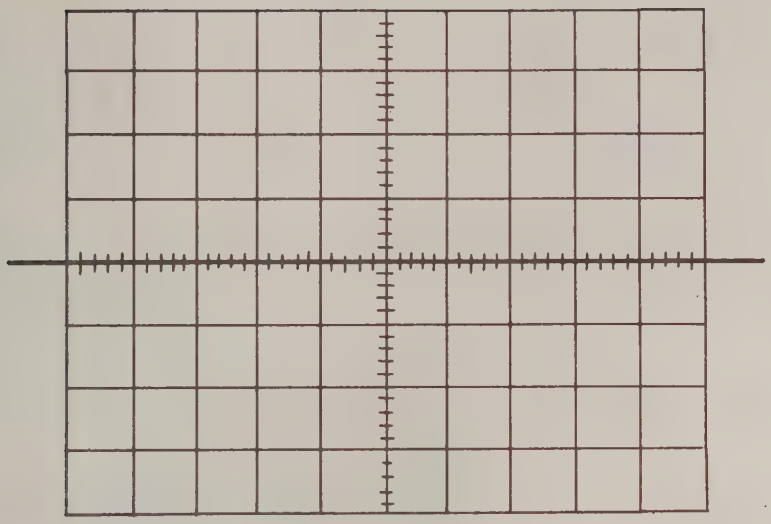
b. Observe the trace of CRT.

c. Adjust Grid Bias Adjustment RV1040 for the trace makes an appear.

⑤ Check/Adjust Trace Rotation

a. Check that the trace is parallel to the center horizontal line.

b. Adjust TRACE ROTATION for a trace that is parallel with the horizontal graticule lines.



⑥ Check/Adjust GEOMetry

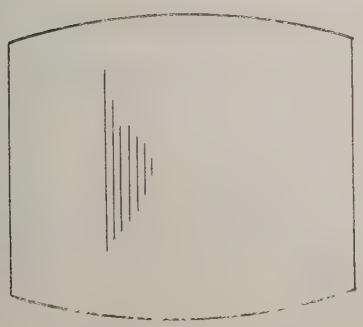
a. Set the A TIME/DIV switch to the 1mS, and AC-GND-DC to DC.

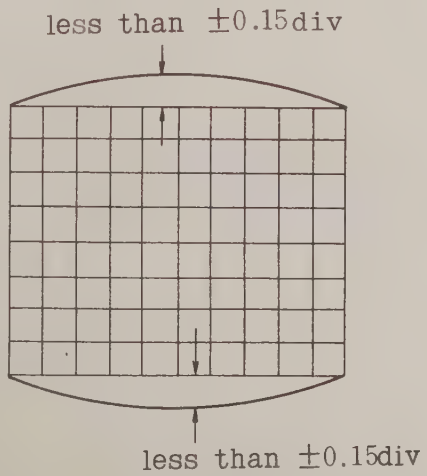
b. Connect the Constant Amplitude Signal Generator to the input.

c. Set the VOLTS/DIV switch setting for a full-screen (8 division) deflection.

d. Check that horizontal bowing is less than ±0.15 division.

e. Adjust the GEOM adjustment RV1035 for a display that is parallel with top and bottom horizontal lines.

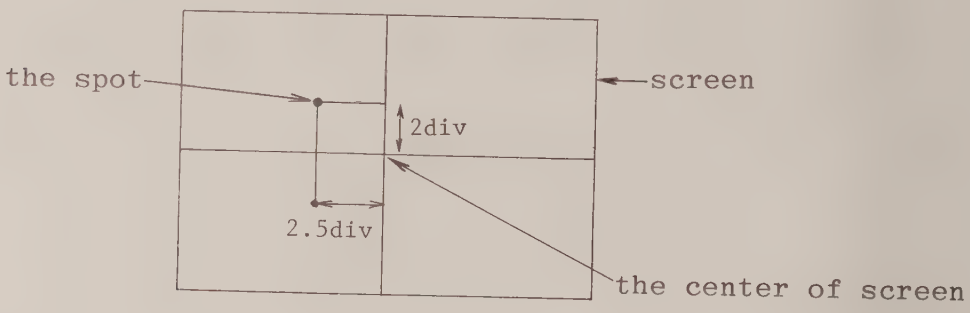




⑦ Check/Adjust ASTIGmatism and FOCUS.

a. Vertical Mode switch to the CH2 [X-Y] position, and Display switch to the [X-Y] position, and AC-GND-DC to DC.

b. Set the [POWER ON] INTENSITY control for a small spot, as the following figure, using position controls.



c. Check that the spot is round.

d. Adjust the FOCUS adjustment and the ASTIG adjustment RV1038 for a round spot.

HORIZONTAL SYSTEM

Control Settings

Preset the controls as given in the Preliminary Control settings.

⑧ Check/Adjust Delay time

a. Vertical Mode Switch to the CH1 position.

b. Set the A TIME/DIV switch to the 1 mS.

c. Set the B TIME/DIV switch to the 0.5 μS.

d. Set the input AC-GND-DC to DC, connect the cable to the output of the time mark generator, set the time mark generator for 1 mS time marks.

e. Display switch to the INTEN.

f. Connect the cable to the output of the time mark generator.

g. Set the time mark generator for 1 mS time marks.

h. Set the DELAY TIME MULT dial to 1.00.

i. Check that intensified portion of the sweep begins at the second time marker (It may be necessary to readjust the INTENSITY control, so that the intensified portion of the sweep is visible.)

j. Adjust the RV562 so that the intensified portion of the sweep begins at the start of the second time marker.

k. Set the DELAY TIME MULT dial to 9.00.

l. Check that intensified portion of the sweep begins at the tenth time marker.

m. Adjust the RV560 so that the intensified portion of the sweep begins at the start of the tenth time marker.

n. Repeat both the RV562 and the RV560 adjustments for no visible interaction.

(9) Check/Adjust Horizontal Gain

a. DISPLAY switch to the A position.

b. Check that the time marks align with the graticule lines over the center eight divisions, within 2%.

c. Adjust H GAIN adjustment RV813 so that the time marks align with the center eight graticule lines.

(10) Check/Adjust B Sweep Start

a. Set the input AC-GND-DC to GND.

b. Set the A TIME/DIV switch to the 2 mS.

c. Adjust the Position control so that the beginning of the A sweep is coincident with the first vertical graticule line

d. Set the B TIME/DIV switch to the 1 mS.

e. DISPLAY switch to the B position.

f. Check that the beginning of the B sweep is identical with the first vertical graticule line.

g. Adjust the RV 714 so that the beginning of the sweep is identical with the first vertical graticule line.

(11) Check/Adjust B Sweep Calibration

a. Set the input AC-GND-DC to DC.

b. Check that the time marks align with the graticule lines over the center eight divisions, within 2%.

c. Adjust B SWEEP CAL adjustment RV742 so that the time marks align with the center eight graticule lines.

(12) Check/Adjust Horizontal X10 MAG Gain

a. DISPLAY switch to the A position, set the A TIME/DIV switch to the 1 mS.

b. Set X10 MAG (Pull out the inner knob of the POSITION control).

c. Check that the one-cycle time marks align with the ten-divisions graticule lines, within 2%.

d. Adjust MAG GAIN adjustment RV804 for one-cycle time marks align with the ten-divisions graticule lines.

e. Push in the inner of the POSITION control after the adjustment and check.

(13) Check/Adjust MAG CENT

a. Set the A TIME/DIV switch to the 0.1 mS.

b. Being the inner shuft of H. POSITION is in pulled out state (X10 MAG), the left end of the trace is brought to the center point and then the inner shuft of H. POSITION is depressed.

c. Observe the movement of the left end of the trace.

d. Adjust the MAG CENT adjustment RV811 for the movement of the left end of the trace within ±0.2 div.

⑭ Check/Adjust High speed sweep accuracy

a. Set the input AC-GND-DC to DC.

b. Display switch to the A position.

c. Set the time mark generator for 50 ns time marks.

d. Set the A TIME/DIV switch to 50 ns.

e. Check that the time marks align with the graticule lines over the center eight divisions.

f. Adjust CV530 at that the time marks align with center eight graticule lines.

g. Display switch to the B position.

h. Set the A TIME/DIV switch to 0.2 μs.

i. Set the B TIME/DIV switch to 50 ns.

j. Refer part (e) through (f) (in this case, adjust CV730)

k. Display switch to the A position.

l. Set the A TIME/DIV switch to 5 μs.

m. Set the time mark generator for 5 μs time marks.

n. Refer part (e) through (f) (in this case, adjust CV534).

o. Display switch to the B position.

p. Set the A TIME/DIV switch to 20 μs.

q. Set the B TIME/DIV switch to 5 μs.

r. Refer part (e) through (f) (in this case, adjust CV 734).

s. Display switch to the A position.

t. Set the A TIME/DIV switch to 20 ns.

u. Set the time marks generator for 20ns time marks.

v. Refer part (e) through (f) (in this case, adjust RV540).

w. Display switch to the B position.

x. Set the A TIME/DIV switch to 50 ns

y. Set the B TIME/DIV switch to 20 ns.

z. Refer part (e) through (f) (in this case, adjust RV740).

α. Check all other ranges of timing within 2%.
Use appropriate settings on the time mark generator.

VERTICAL SYSTEM

Control Setting

Preset the controls as given in the Preliminary Control Settings

⑮ Check/Adjust DC Balance (Step attenuator balance).

a. Set the VOLTS/DIV switch to the 5mV position.

b. Position the trace to the horizontal center line.

c. Change the VOLTS/DIV switch to the 10mV position.

d. Check that the trace is within 0.1 division of the center horizontal line.

e. Adjust the CH1 (CH2) DC BAL adjustment, RV7 (CH1) or RV107 (CH2), for a trace at the horizontal center line (DC BAL adjustment RV7 and RV107 are possible to adjust at the adjusting point on the front panel.)

f. Repeat part (a) through (e) until less than 0.1 division shift is noted when changing the VOLTS/DIV setting.

⑯ Check/Adjust Vertical Position Center.

a. Confirm the vertical POSITION control at the midrange.

b. Check the trace is within 1 division.

c. Adjust the Position Center adjustment RV73 (CH1), RV173 (CH2) for a trace at the horizontal center line.

⑰ Check/Adjust ADD BALANCE

a. Set the A TIME/DIV to the 1ms position, the Display switch to A.

b. Set the CH1 and CH2 AC-GND-DC switchs to GND.

c. Set the V MODE switch to CH1.

d. Adjust the vertical Position control that the trace is identical with the center horizontal graticule line.

e. Next, set the V MODE switch to CH2 and adjust the vertical Position control that the trace is identical with the center horizontal graticuls line.

f. Set the V MODE switch to ADD.

g. Check that the trace is identical with the center horizontal graticule line within $\pm$ 0.5 division.

h. Adjust ADD BAL adjustment RV327 for two times of the difference with the center horizontal graticule line.

⑱ Check/Adjust X1 AC GAIN

a. Set the A TIME/DIV switch to the 1mS position.

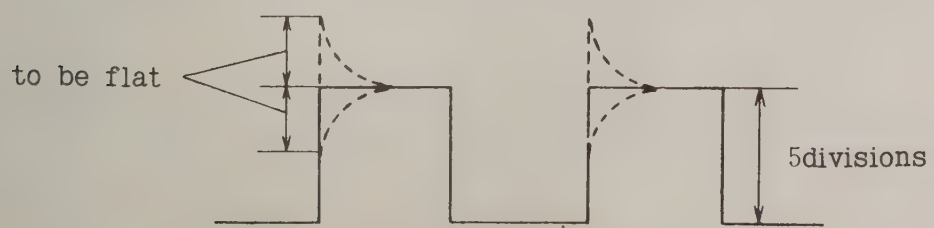
b. Set the VOLTS/DIV switch to the 10mV position.

c. Set the AC-GND-DC switch to DC.

d. Connect the square-wave generator (using 1KHz out put range).

e. Adjust the output amplitude of that generator for 5 division deflection of screen.

f. Check the high-voltage level of pulse is flat.



g. Adjust the X1 AC GAIN RV33(CH1), RV133(CH2) adjustment for a flat level.

⑲ Check/Adjust Vertical Gain.

a. Set the A VOLTS/DIV switch to the 10mV position and AC-GND-DC switch to DC.

b. Connect the standard amplitude calibrator to the input.

c. Set the standard amplitude calibrator for a 50mVp-p (5 divisions of display) signal.

d. Check for a display of five divisions.

e. Adjust GAIN adjustment RV339(CH1), RV160(CH2) for a display of 5 divisions within 2%.

f. Check all the VOLTS/DIV switch settings.

⑳ Check/Adjust Input Capacity (ATT: ÷1).

a. Set the VOLTS/DIV switch to 10mV position.

b. Set the AC-GND-DC switch to DC.

c. Connect the L-C meter to the input terminals.

d. Check the input capacity for approximately 28 pF.

e. Adjust CV3(CH1), CV103(CH2) for a 28 pF input capacity.

㉑ Check/Adjust Vertical Step Response

a. Set the VOLTS/DIV switch to the 10mV position.

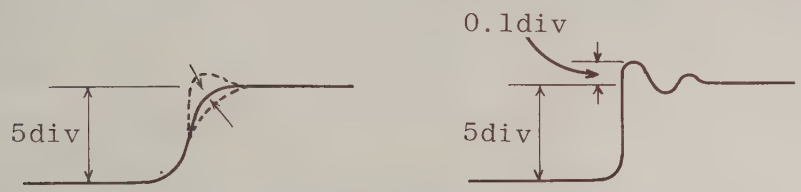
b. Set the A TIME/DIV switch to the 20 ns position.

c. Connect the fast-rise, positive output (50mV, 1kMz) of the square-wave generator to the input. Use a 50-ohm termination and cable.

d. Set the square-wave generator to 1MHz. Adjust the square-wave generator output for a 5-divisions display.

e. CH1 - Set CV63 and RV63 to the midposition. And adjust CV325, CV342 and CV344 for a square wave that is flat. Then, adjust CV63 and RV63 for over-shoot that is +0.1 div.

CH2 - Adjust CV163 and RV163 for over-shoot that is +0.1 div.



(22) Check/Adjust Attenuation Compensation

(ATT : ÷10, ÷100, ÷250)

a. Set the AC-GND-DC switch to DC.

b. Connect the square-wave generator to the CH1 (CH2) input terminal check for a square wave that is flat (flat top) under the following settings.

ATT	VOLT/DJV	The squarewave generator output
÷ 10	50mV	0.25V
÷100	0.5V	2.5 V
÷250	5 V	25 V

c. Adjust the trimmer condensers (refer the circuit bord illustration with adjustment location - page 37) for a squarewave that is flat (flat top) under the following settings.

ATT	VOLT/DIV	The squarewave generator output	Adjust CH1 (CH2)
÷ 10	50mV	0.25V	Comp-1/10
÷100	0.5V	2.5 V	Comp-1/100
÷250	5 V	25.0V	Comp-1/250

(23) Check/Adjust Input Capacity (ATT: ÷10, ÷100, ÷250)

a. Connect the L-C meter to the Input terminal.

b. Check the Input capacity for a approximately 28pF.

c. Adjust the trimmer condensers for a 28pF Input capacity under the following settings.

ATT	VOLTS/DIV	Adjust CH1 (CH2)
÷ 1	10mV	Cin - 1/10
÷ 10	0.1V	Cin - 1/100
÷100	1 V	Cin - 1/250

TRIGGERING SYSTEM

(24) Check/Adjust A TRIG CENT

a. Set A TRIG SOURCE switch to CH1, A TRIG COUPLING switch to AC, A TRIG SLOPE knob push in, the VOLTS/DIV switch to 10mV, the A TIME/DIV switch to 20μs.

b. Connect the sine-wave generator to the input for a 0.3div (50kHz).

c. Set A TRIG LEVEL knob to the midposition.

d. Adjust RV441 so that synchronization is effected on the waveform, 0.3div on the screen.

e. Under the state of (d), if synchronization is not effected by switching A TRIG COUPLING to "DC", set CH1(CH2) DC LEVEL adjustment RV211 (CH1) and RV311(CH2) so that synchronization is effected.

f. Next, set A TRIG SLOPE to -(pulled out state) and insure that synchronization is effected. After confirmation, leave A TRIG-SLOPE in depressed state. Readjust when stepped out.

(25) Check/Adjust B TRIG CENT

a. Set A TRIG SOURCE switch to CH1, B TRIG SLOPE knob push in, the B TIME/DIV switch to 5μs. Set the DISPLAY switch to INTEN.

b. Set B TRIG LEVEL knob to the midposition.

c. Check for the intensified portion of the sweep.

d. Adjust RV622a so that the intensified portion of the sweep appears. (Synchronization is effected).

e. Next, set B TRIG slope to -(pulled out state) and insure that synchronization is effected. After confirmation, leave B TRIG-SLOPE in depressed state. Readjust when stepped out.

(26) Check/Adjust TRIG VIEW Position

a. Set the A TIME/DIV switch to the 1mS.

b. Set the V MODE switch to ALT (or CHOP).

c. Push the TRIG VIEW button in.

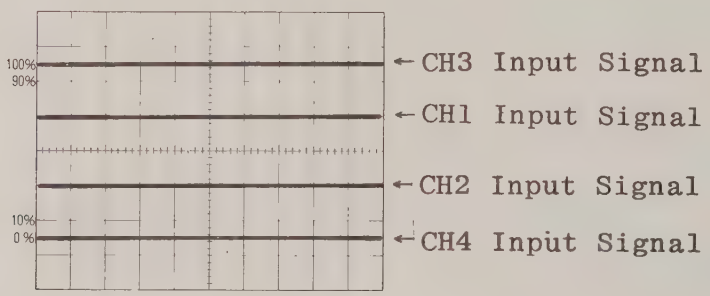
d. Set the A TRIG LEVEL knob to the midposition.

e. Observe the four-trace display (CH1, CH2, CH3: A TRIG signal, CH4: B TRIG signal).

f. Check that the CH3 trace is identical with the horizontal 100% graticule line and the CH4 trace is identical with the horizontal 0% graticule line.

g. Adjust the A POS adjustment RV231 so that the CH3 trace comes to the ±1 div on the 100% graticule line.

h. Adjust the B POS adjustment RV249 so that the CH4 trace comes to the ±1 div on the 0% graticule line.



(27) Check/Adjust CH3 (A EXT TRIG) and CH4 (B EXT TRIG)

a. Set the A TRIG SOURCE switch to the EXT position, the A COUPLING switch to the DC point, the A MODE switch to the AUTO position, the B TRIG SOURCE switch to the EXT position, and push the TRIG VIEW button in.

b. Connect the square-wave generator (using 1kHz out put range) to CH3 (A EXT TRIG) and CH4 (B EXT TRIG) terminal. Use a 50-ohm termination and cable.

c. Check the high-voltage level of pulse is flat.

e. Adjust CV423 (CH3), CV603 (CH4).

(28) X-Y Operation

(28-1) Check/Adjust X Gain.

a. Set the vertical MODE switch to CH2 [X-Y], the DISPLAY switch to [X-Y], the AC-GND-DC switch of CH1 to DC, the AC-GND-DC switch of CH2 to GND.

b. Set the VOLTS/DIV switch to the 10mV position, with X1 GAIN.

c. Connect the standard amplitude calibrator to the CH1 input.

d. Set the standard amplitude calibrator for a 50mV.

e. Check for a display of five divisions.

f. Adjust the X GAIN adjustment RV783a for a display of five divisions within 3%.

(28-2) Check/Adjust X Position Center

a. Set the DISPLAY switch to [X-Y] position, the vertical MODE switch to CH2/ [X-Y] position and the horizontal POSITION control to the midposition, the AC-GND-DC switch of CH1 to GND.

b. Check to see that round spot is near the center graticule and is within 0.2 division against horizontal line.

c. Adjust the X CENT adjustment RV208 to position spot at the center.

(28-3) Check/Adjust X-Y phasing

a. Set the AC-GND-AC switch of CH1 and CH2 to DC.

b. Connect the constant amplitude signal generator to the CH1 and CH2 inputs through 500Ω BNC cable, 500Ω BNC termination.

c. Adjust the constant amplitude signal generator for an eight division horizontal display of 1MHz.

d. Center the display vertically and horizontally with the CH1 and CH2 POSITION controls.

e. Check CRT display for an opening at the center horizontal line of 0.4 division or less.

f. Adjust CV782A so that the opening at the center horizontal line becomes to 0 division.

g. Adjust the constant amplitude signal generator for eight division horizontal display of 2MHz, comfirm CRT display for an opening at center horizontal line 0.4 division or less.

CALIBRATOR

(29) Check/Adjust CAL terminal (0.5Vp-p, 1KHz)

a. Connect the CAL terminal to the Digital frequency counter.

b. Check for the CAL frequency of 1KHz, within 1%.

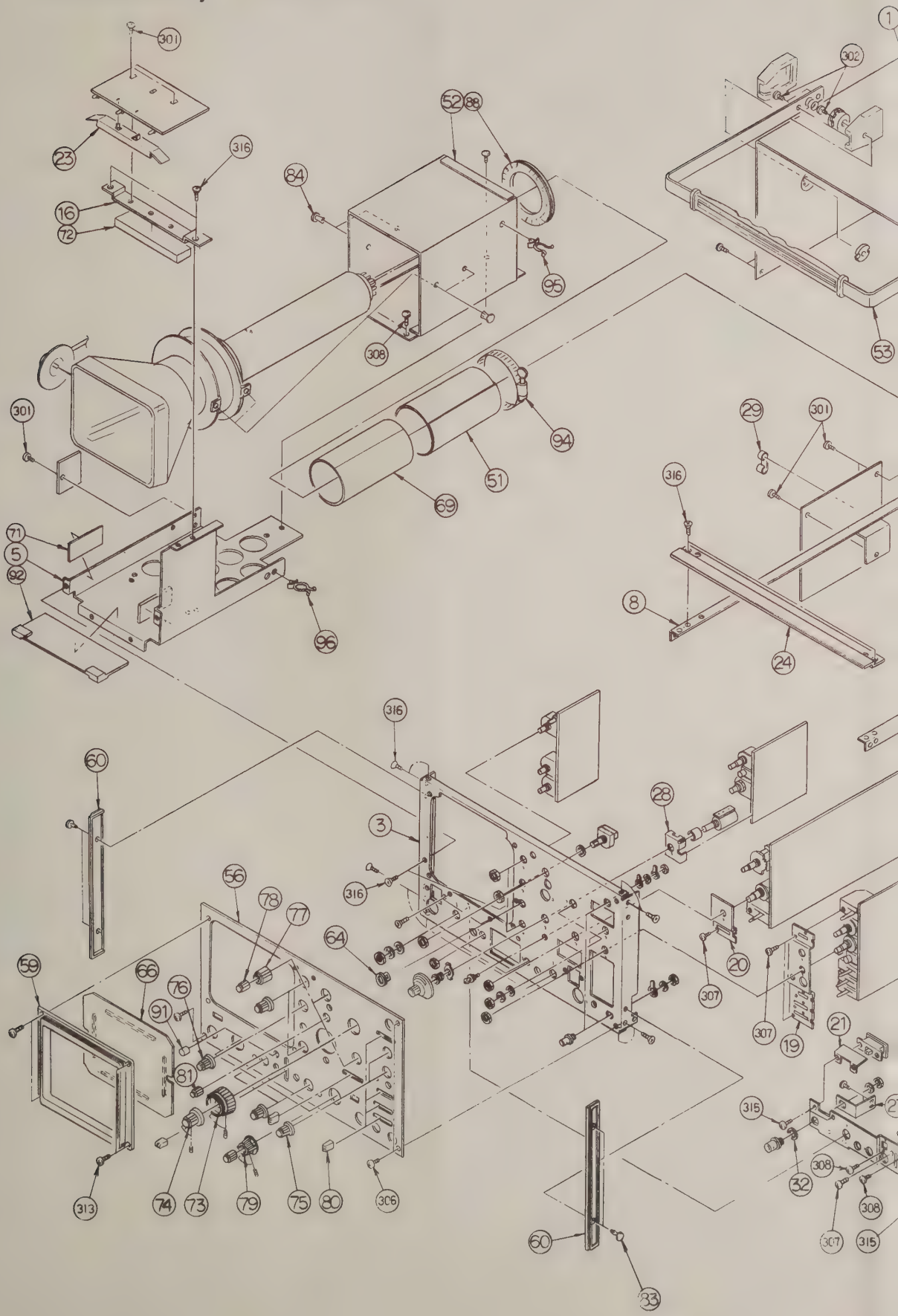
c. Adjust the 1KHz adjustment RV1203 for the CAL frequency of 0.99 to 1.01 KHz.

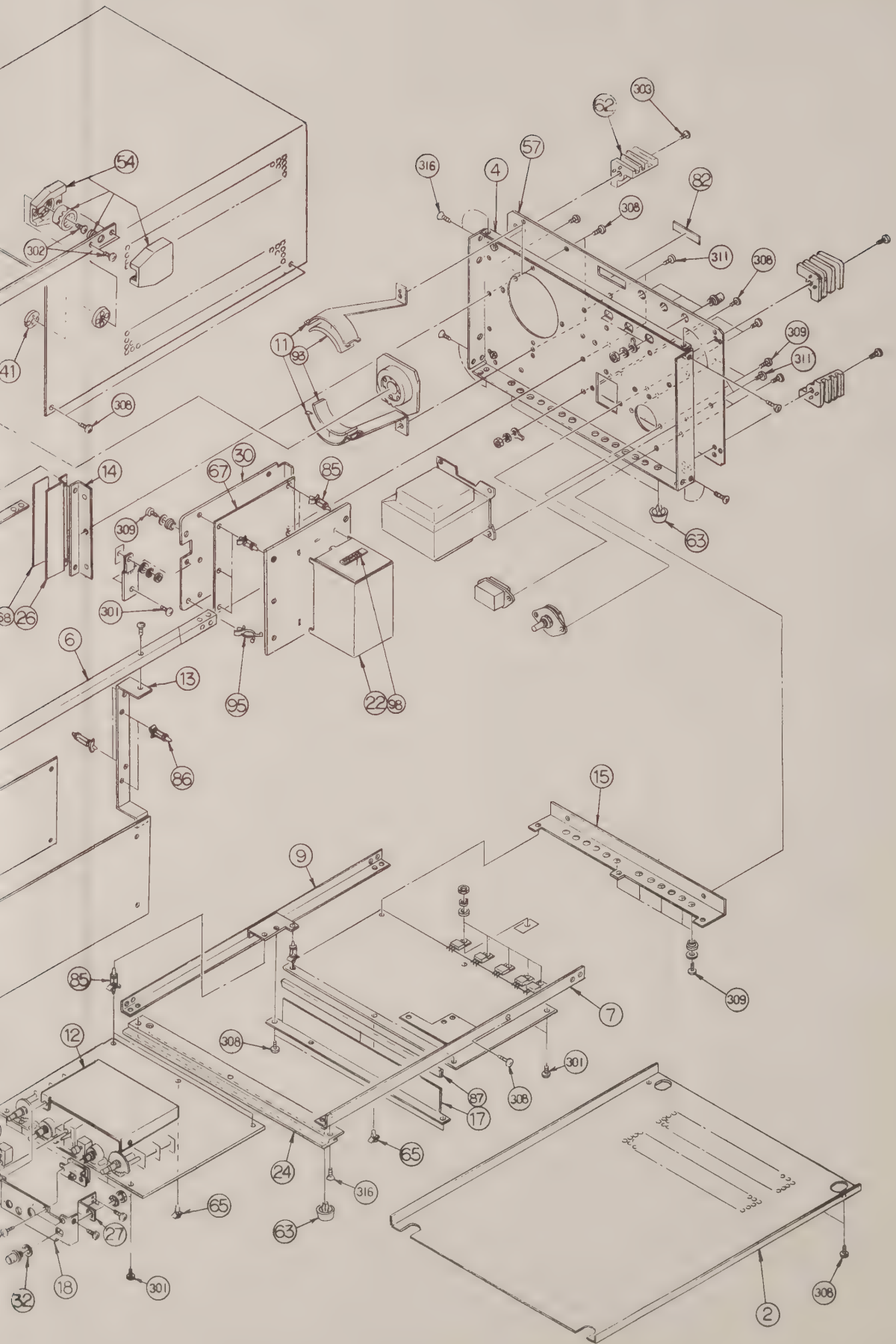
d. Next, connect the CAL terminal to the Digital Multimeter, short the terminal 1 to 3 of the connector (P1202).

e. Check for the CAL output of 0.5V, within 1%.

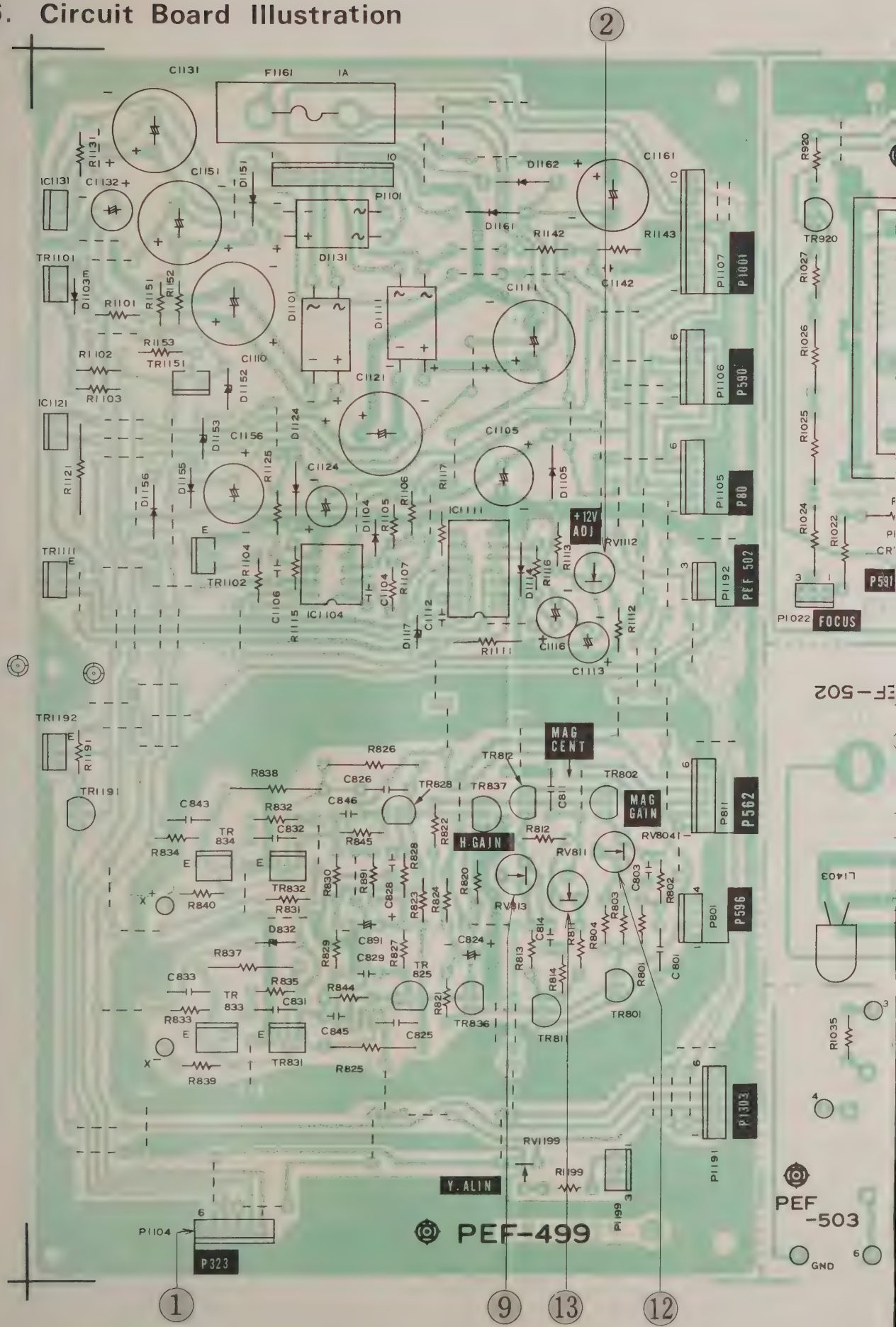
f. Adjust the 0.5V adjustment RV1205 for the CAL output of 0.495 to 0.505 Volt.

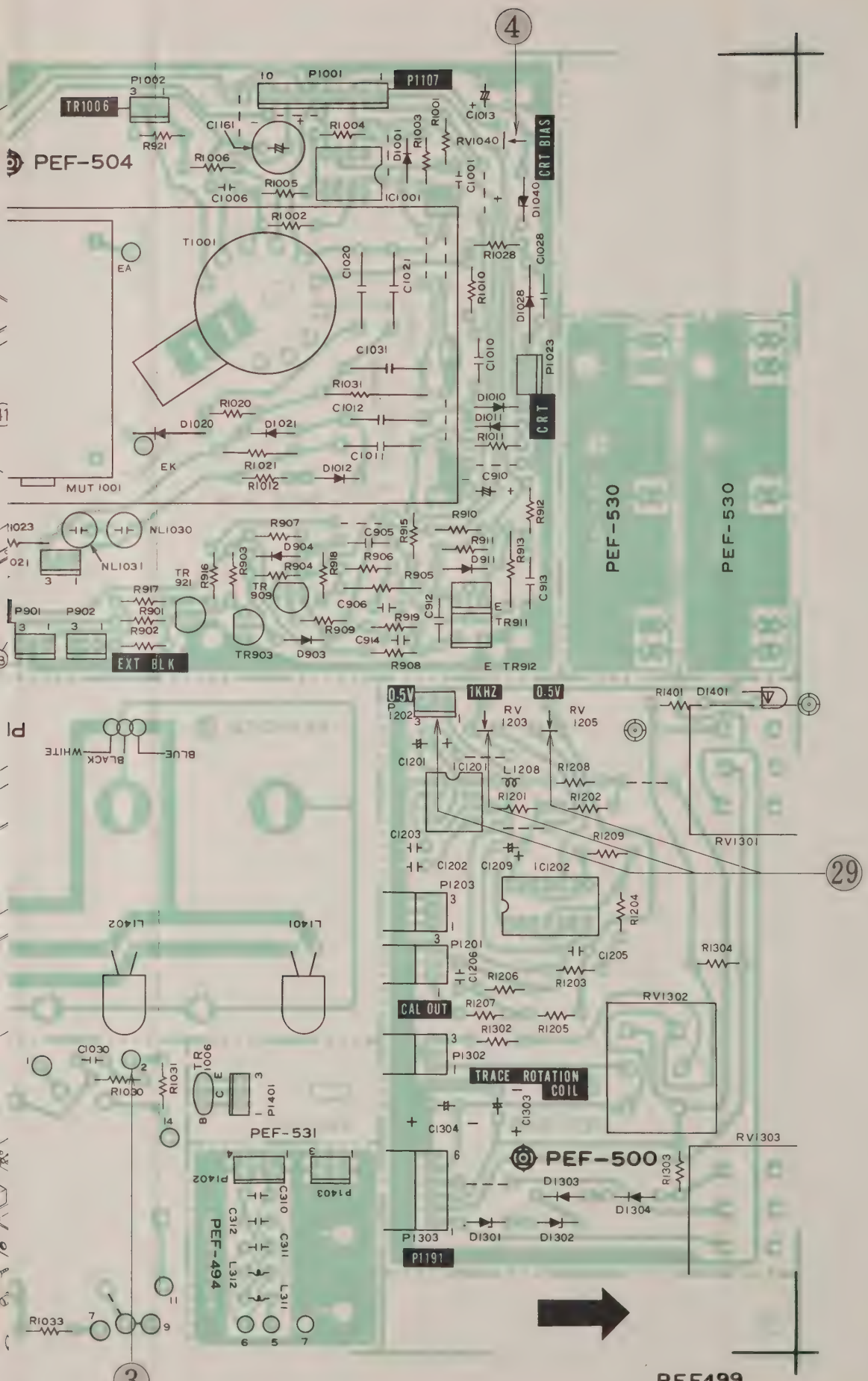
5. Disassembly Illustration

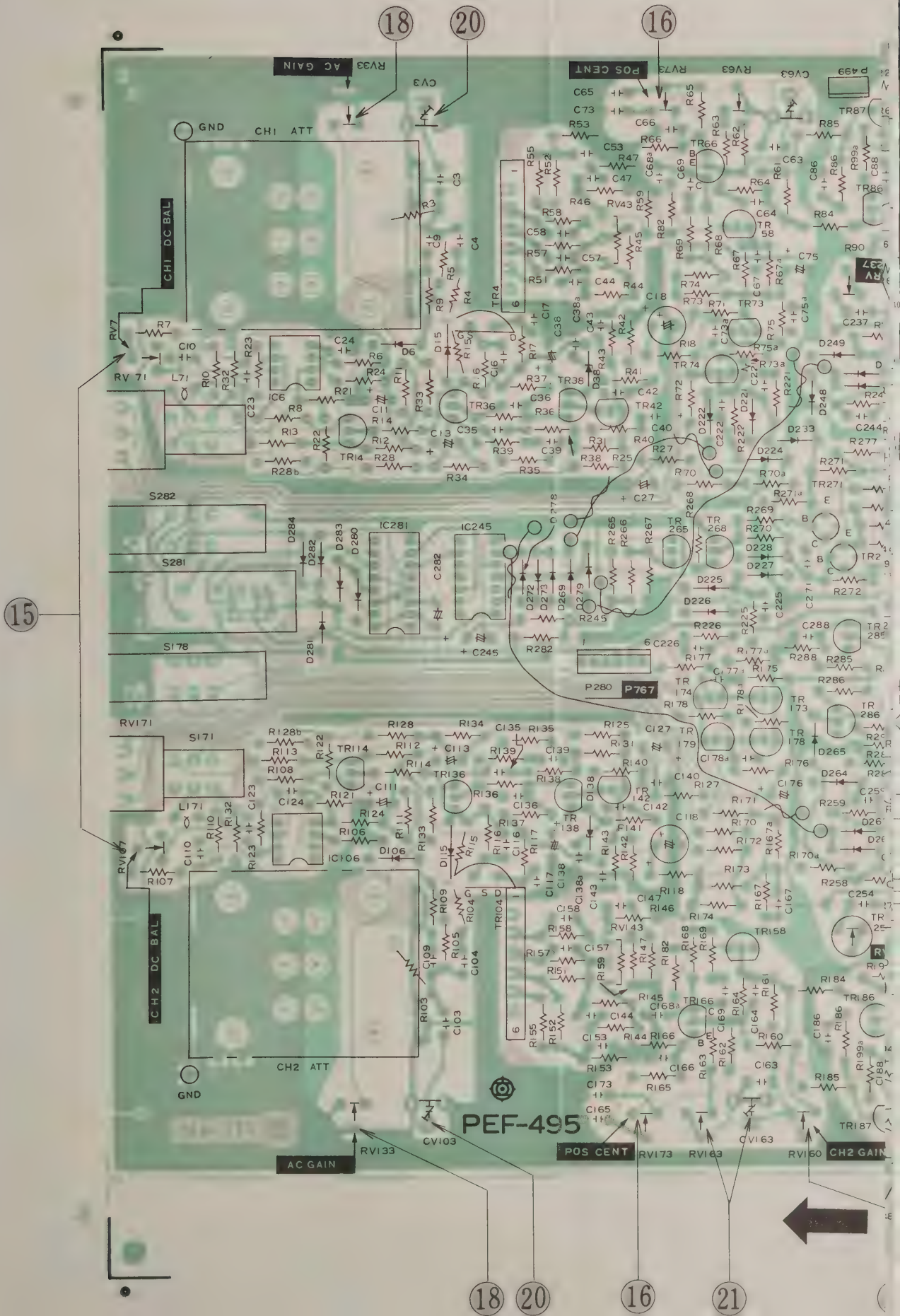



54
302
41
308
316
4
57
62
303
82
308
311
308
309
311
11
93
63
14
67
30
85
309
301
26
6
13
95
22
98
86
15
309
9
85
7
12
308
301
87
308
17
65
24
316
63
65
27
18
32
301
2
308

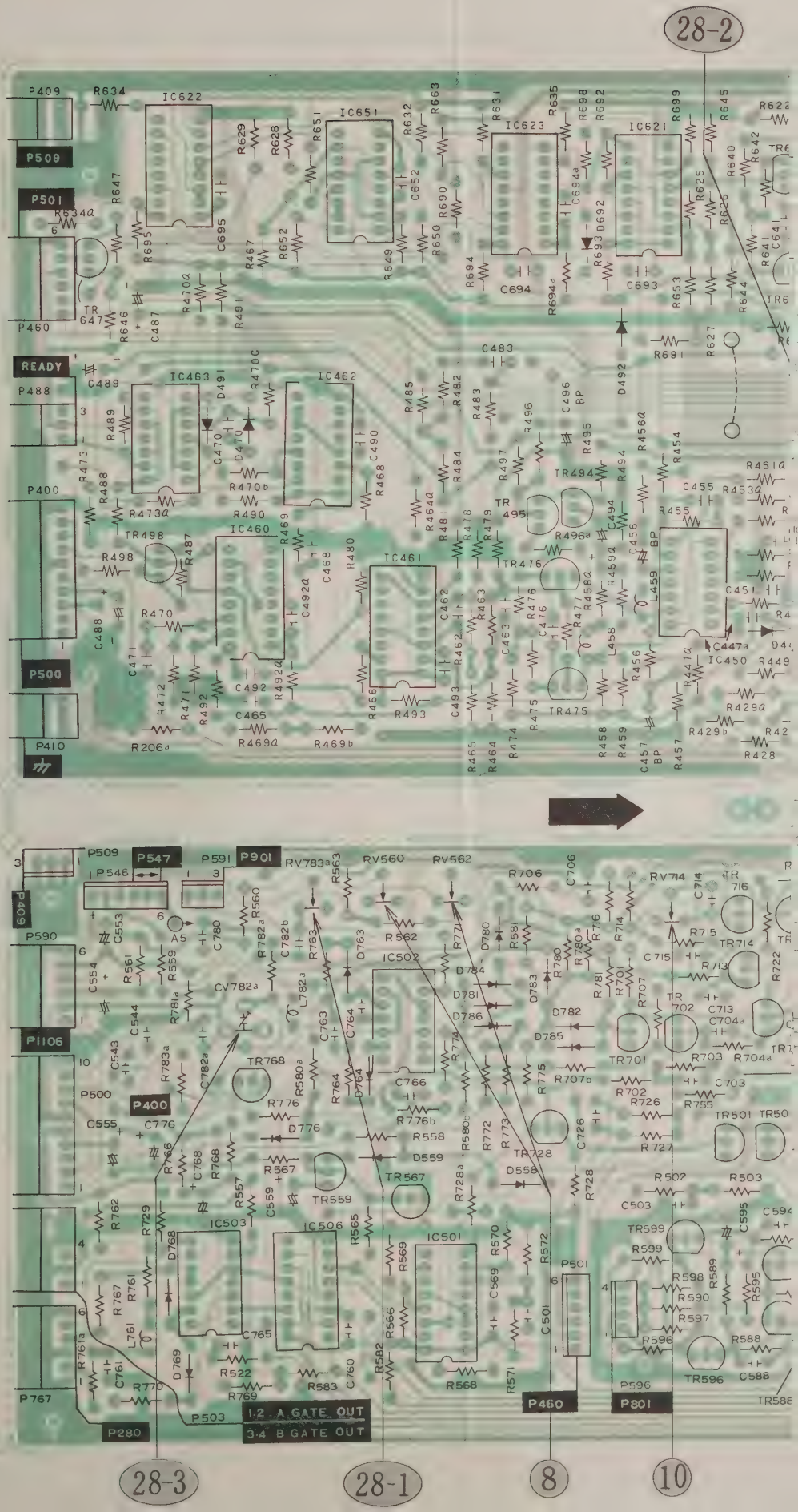
6. Circuit Board Illustration

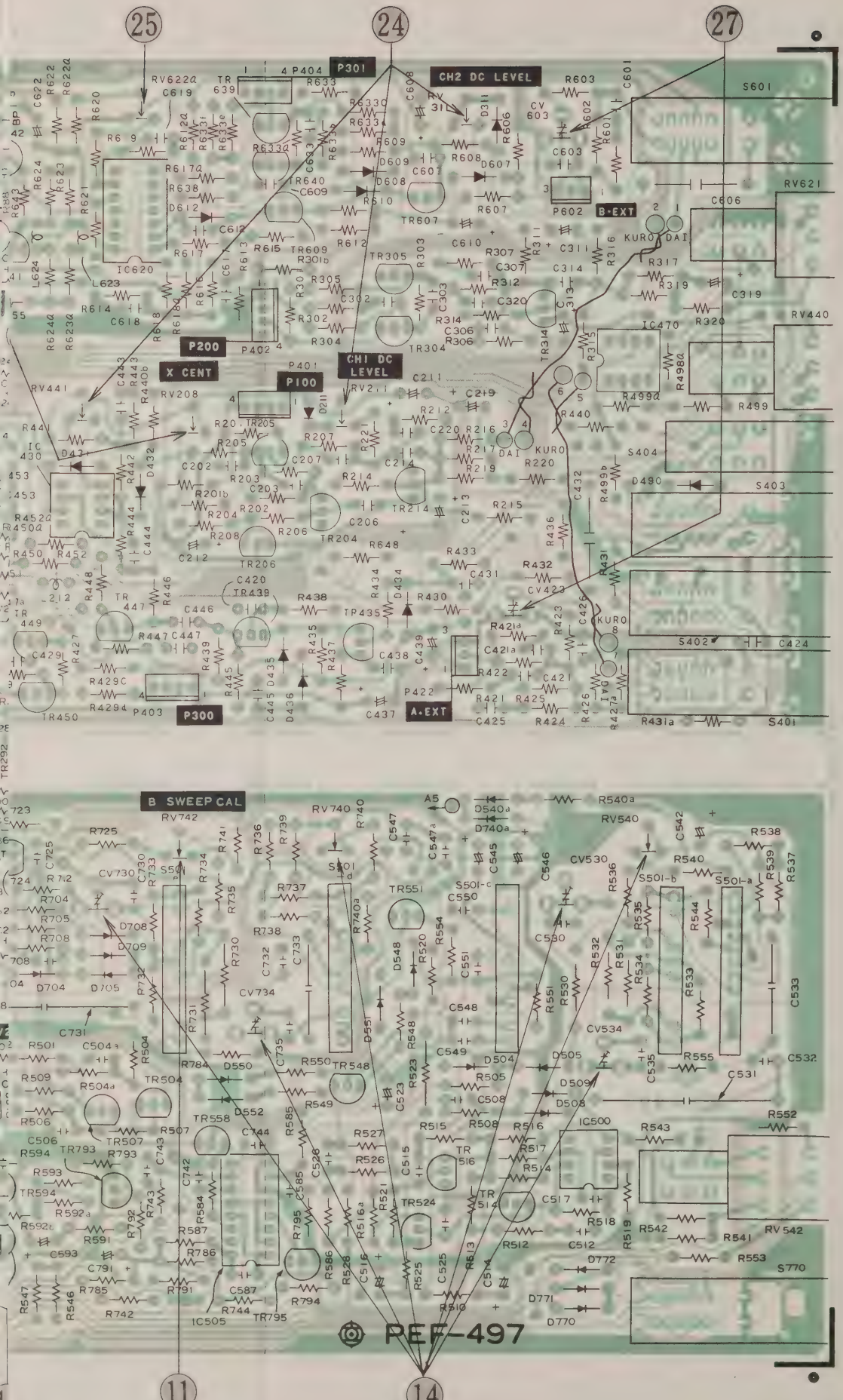



4
P1002
TR1006
R921
P1001
P1107
C1161
R1004
R1001
C1013
RV1040
CRT BIAS
PEF-504
R1006
R1005
C1006
D1001
R1003
IC1001
C1001
D1040
R1002
T1001
EA
C1020
C1021
R1028
C1028
R1010
D1028
C1031
C1010
P1023
R1031
R1020
C1012
D1010
D1011
CRT
D1020
D1021
R1011
EK
R1021
R1012
D1012
C910
MUT1001
PEF-530
PEF-530
NL1030
NL1031
R907
C905
R915
R910
R912
D904
R906
R911
R916
R903
R904
R918
R905
R913
D911
TR 921
TR 909
C906
C912
C913
R917
R919
E
TR911
P901
P902
R901
C914
R909
R902
TR903
D903
R908
E TR912
EXT BLK
0.5V
1KHZ
0.5V
P1202
RV 1203
RV 1205
RI401
DI401
C1201
IC1201
LI208
R1208
R1201
R1202
C1203
RV1301
R1209
29
C1202
C1209
IC1202
P1203
R1204
P1201
C1205
R1304
C1206
R1206
R1203
CAL OUT
R1207
RV1302
R1302
R1205
P1302
TRACE ROTATION COIL
C1303
C1304
RV1303
PEF-500
R1303
D1303
D1304
P1303
D1301
D1302
P1191
BLACK
WHITE
BLUE
LI402
LI401
C1030
TR 1006
R1031
R1030
P1401
PEF-531
P1402
P1403
C310
C312
C311
PEF-494
L312
L311
R1033
3
PEF499


18
20
16
15
21
AC GAIN
RV33
CV3
POS CENT
RV73
CV63
P499
GND
CH1 ATT
CH1 DC BAL
RV7
RV 71
L71
S282
S281
S178
IC281
IC245
P280
P767
RV171
S171
L171
IC106
CH2 DC BAL
CH2 ATT
GND
PEF-495
AC GAIN
RV133
CV103
POS CENT
RV173
RV163
CV163
RV160
CH2 GAIN

VERTICAL OUTPUT AMPLIFIER
CV325
CV342
CV344
P562
P357
P1104
P1105
P1203
P287
P811
P547
P546
P403
P404
P401
P402
P100
P200
P300
P301
P279
P380
A POS
B POS
GEOM
ASTIG
MOD BAL
CRT
RV231
DL
S279
S357
RV552
RV298
S101
S1
C1
101
TR355
TR353
TR361
TR362
TR366
TR383
TR386
TR337
TR329
TR322
TR330
TR336
TR338
TR93
TR94
TR193
TR194
TR243
TR244
TR291
TR259
D345
D381
D247
D296
D034
D1041
L279
L280
L384
L385
BP
19
26
7
6
17
21


28-2
READY
P409
P509
P501
P460
P488
P400
P500
P410
P547
P591
P901
P546
P1106
P590
P767
P280
P503
1-2 A GATE OUT
3-4 B GATE OUT
P596
P801
28-3
28-1
8
10


25
24
27
P301
CH2 DC LEVEL
P200
X CENT
P100
CH1 DC LEVEL
P300
A-EXT
B-EXT
B SWEEP CAL
11
14
REF-497

23
22
AC GAIN
RV133
CV103
CH2 ATT
CH2 DC BAL
Cin
Comp
1/250
1/100
1/10
RV107
R107
C110
R110
R32
L171
C123
S171
RV171
R123
R128b
C124
R108
R113
R121
R122
R106
C106
D106
R124
C111
R111
R133
R114
R112
R128
TR114
TR136
C113
R134
D115
R115
R116
C116
R117
C103
R103
C109
R105
R104
C104
10A
S
G
D
R109
R155
R152
R151
R157
R158
C157
C158
C117
C143
C138a
C138
R143
R142
R118
C142
R141
C141
R127
R140
C140
R139
C139
R135
R131
R125
C127
TR138
TR137
C137
C136
R138
R137
R136
D138
TR140
TR139
TR179
TR178
TR177
TR176
TR175
TR174
TR173
C178a
C176
R176
R175
C177a
R178a
R178
R177
R177a
C226 6
P280
P767
R288
R286
R285
C288
C225
R225
R226
D226
D225
D227
D228
R270
R269
R268
TR268
TR265
R267
R266
R265
D269
D279
D278
D272
D273
C282
C245
R282
R245
IC281
IC245
D281
D284
D283
D282
D280
S281
S282
S178
R288b
R13
R8
R14
R12
R22
TR14
TR36
C13
C35
R39
R35
R34
R25
R31
R40
C40
C39
R38
R36
C36
TR38
TR42
C42
C35
R37
R33
R11
C11
R24
R6
C24
R21
C23
R23
R10
R32
L71
C10
RV71
R7
RV7
D6
D5
R5
R9
R4
R3
C9
C4
C3
TR4
C7
C38
C38a
C44
C43
R43
R42
R41
R44
R51
R57
R58
R55
R52
RV43
R45
R46
R47
C47
R53
C53
R66
C66
C73
R65
R63
C63
R62
R61
C61
R64
C64
R82
R69
R68
R59
C68a
C69
C67
R67
R67a
R75
C75a
R73
C73a
R71
C71
R72
D222
C222
C221
D221
R221
R222
C22
R22
D224
D233
C233
R233
C244
R244
D247
D246
D248
D249
R243
C243
R237
C237
R237
C75
R90
R84
C86
R86
TR86
R88
C88
R85
C85
TR87
R87
P499
C65
R73
RV63
CV63
POS CENT
RV163
RV173
CH2 GAIN
RV160
CV163
TR187
R188
C188
R185
R199a
C186
R186
TR186
R184
R190
RV254
TR158
R258
C254
R254
R167a
R170a
D262
D263
R259
C259
R264a
D264
D265
R289
R290
R292
TR292
R283
TR285
R272
R275
R274
R273
R276
TR271
R271a
R271
R277

P546
P547
P357
RV298
P811
P562
P287
P549
P1203
S357
R882
R881
C880
R880
S1
C1
S101
C101
L384
L385
R384
R385
R386
R387
TR386
TR383
C381
R389
P380
C389
CV344
TR362
TR361
TR353
TR337
TR338
TR330
TR329
TR327
TR326
TR325
TR321
TR322
C391
R390
C376
C373
C366
C361
C355
C354
C353
C341
C329
C325
C321
C327
R376
R375
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R372
R371
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R368
R367
R366
R365
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R356
R355
R354
R353
R344
R343
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R338
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R336
R334
R333
R330
R328
R327
R326
R325
R324
R323
R322
R321
R319
R314
R313
CV342
RV339
RV335
RV327
RV325
RV231
RV1038
RV1035
P1038
P1034
P1104
P1105
P323
P562
P357
P380
P811
P1203
P546
P547
P402
P403
P404
P401
P562
P287
P279
P200
P300
P301
P100
P80
ASTIG
GEOM
C.R.T
ADD
BAL
A POS
B POS
DL
D345
D341
D338
D334
C1042
C1043
C1041
C1034
C1035
C1038
R1037
R1036
R1035
R1034
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R1022
R1021
R1020
R1019
R1018
R1017
R1016
R1015
R1014
R1013
R1012
R1011
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R1005
R1004
R1003
R1002
R1001
C1001
C1002
C1003
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C1024
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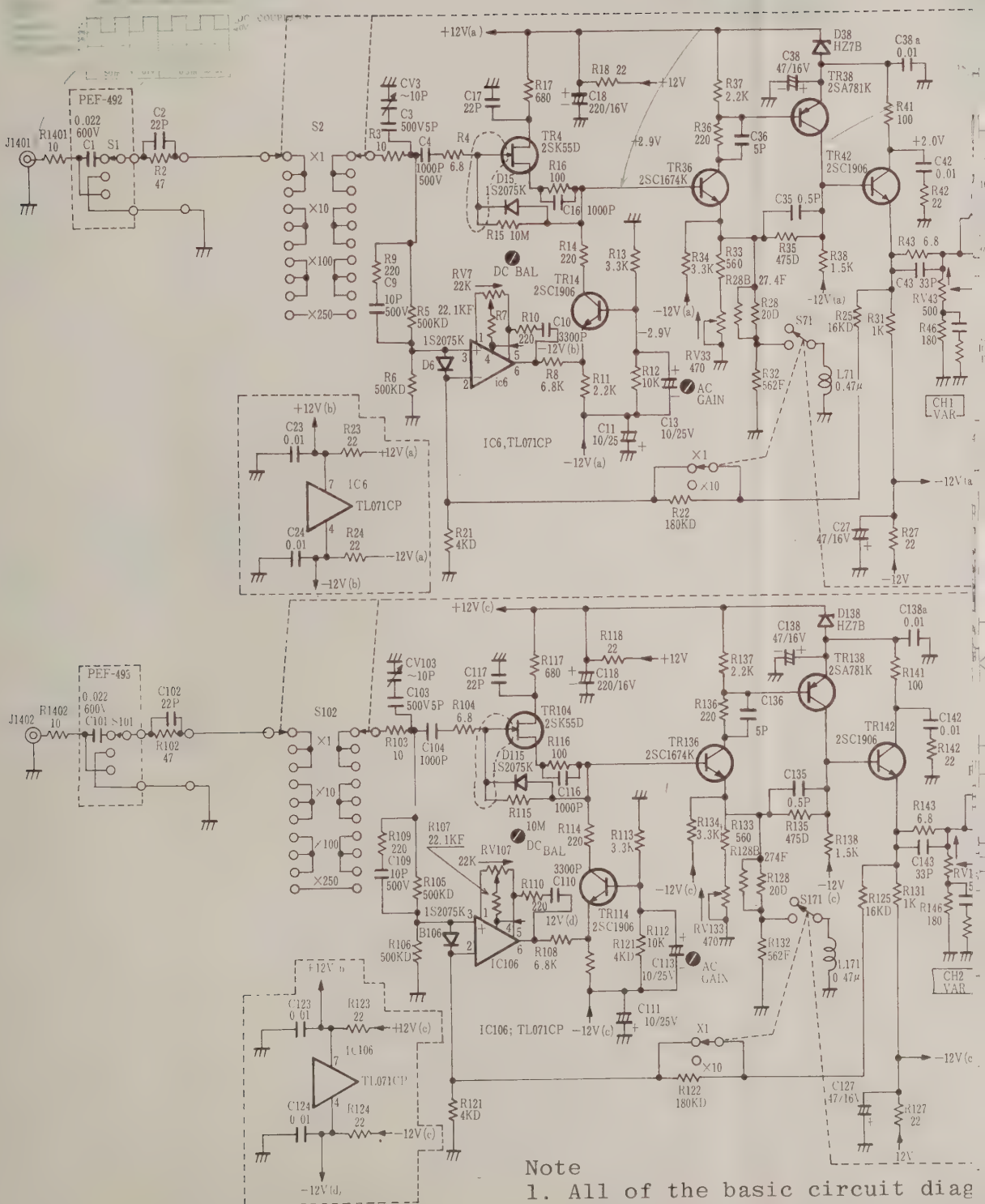
C1028
C1029
C1030
C1031
C1032
C1033
C1034
C1035
C1036
C1037
C1038
C1039
C1040

DIAGRAM

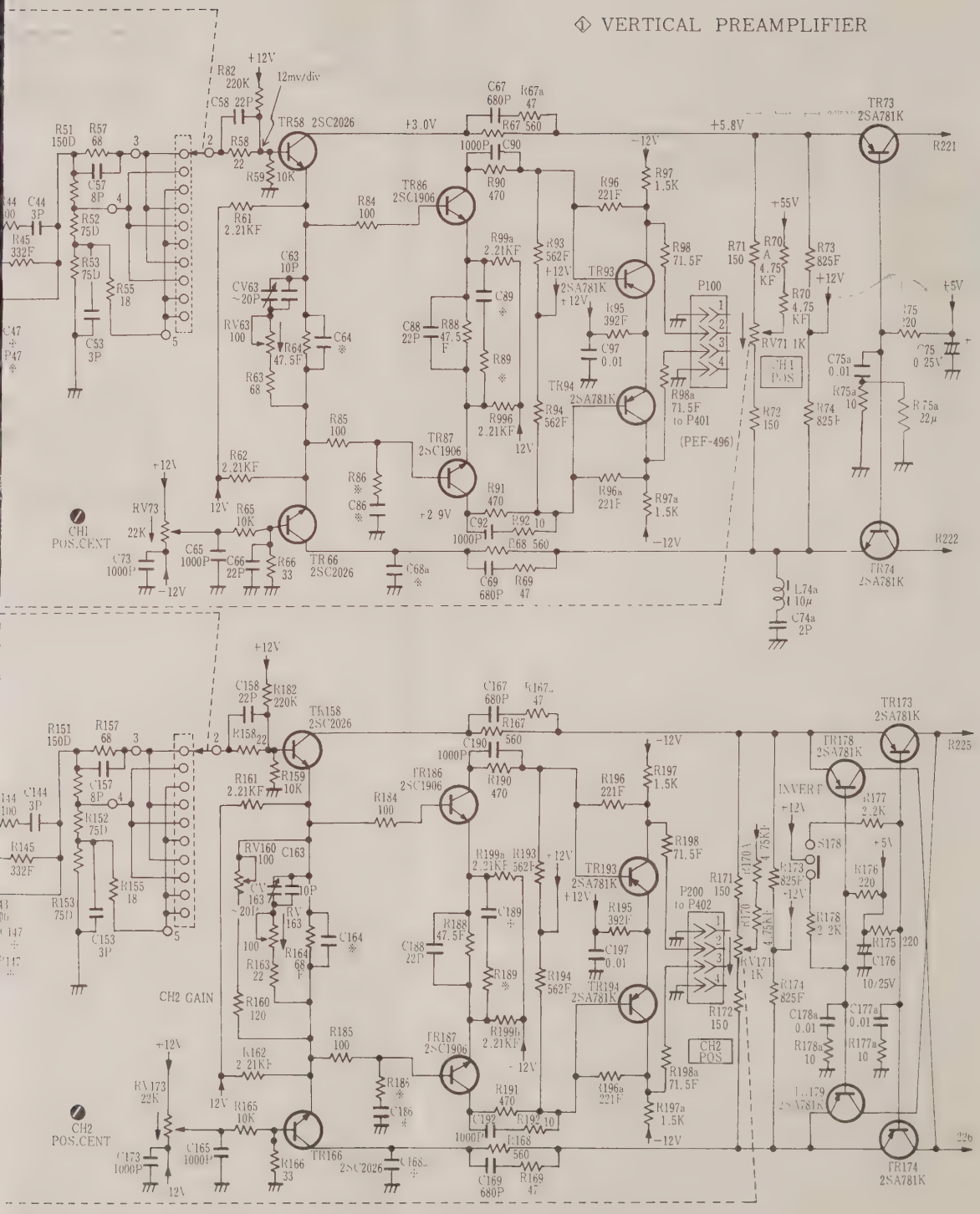
※ : Refer to ELECTRIC PARTS LIST, when this symbol is remarked.

7. Diagram



Note

1. All of the basic circuit diag
   subject to change without not
2. All resister values in ohm: l
   and all capacitor values in m
   farad unless indicated.
3. ※ Factory selected values.



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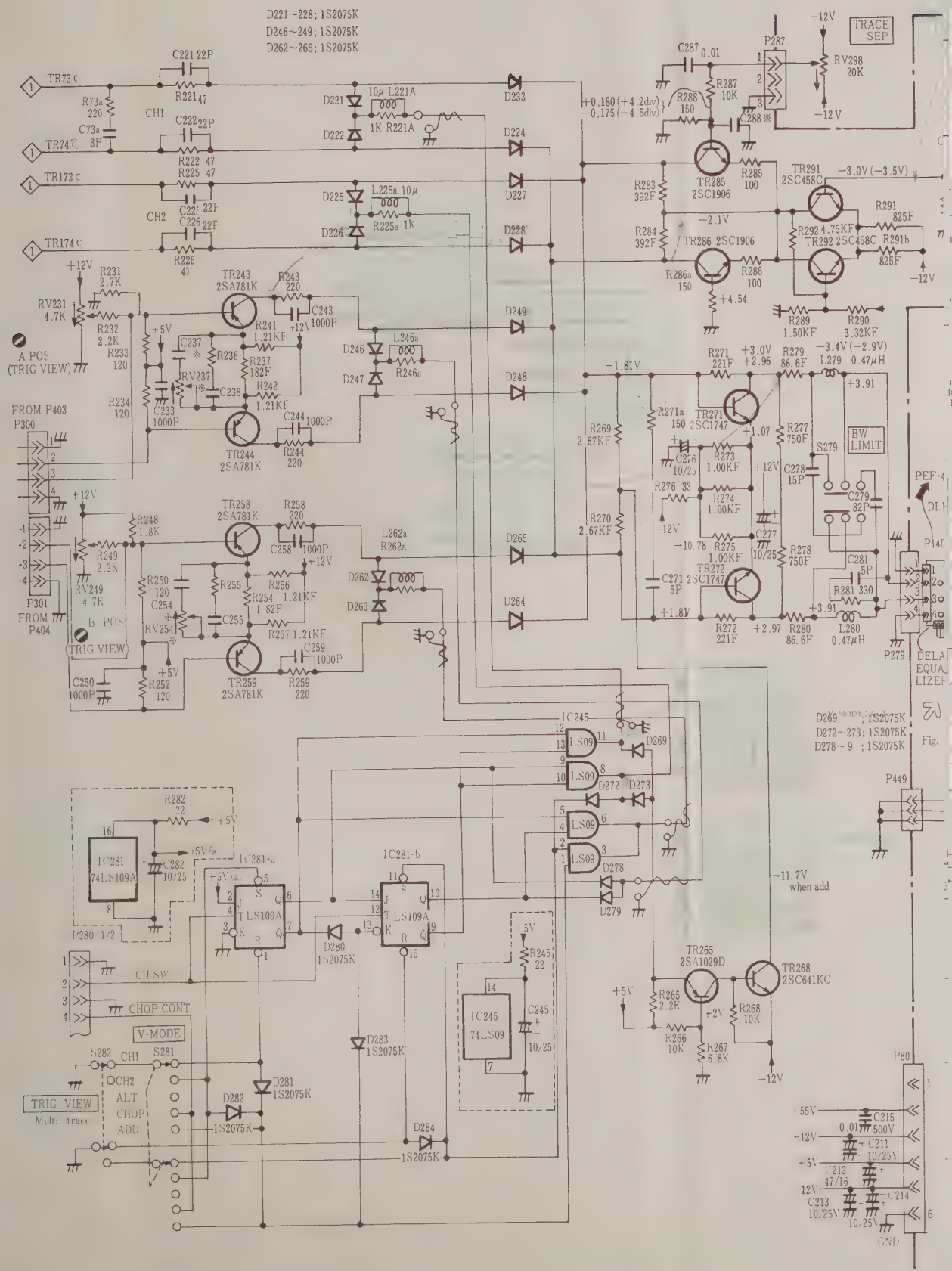
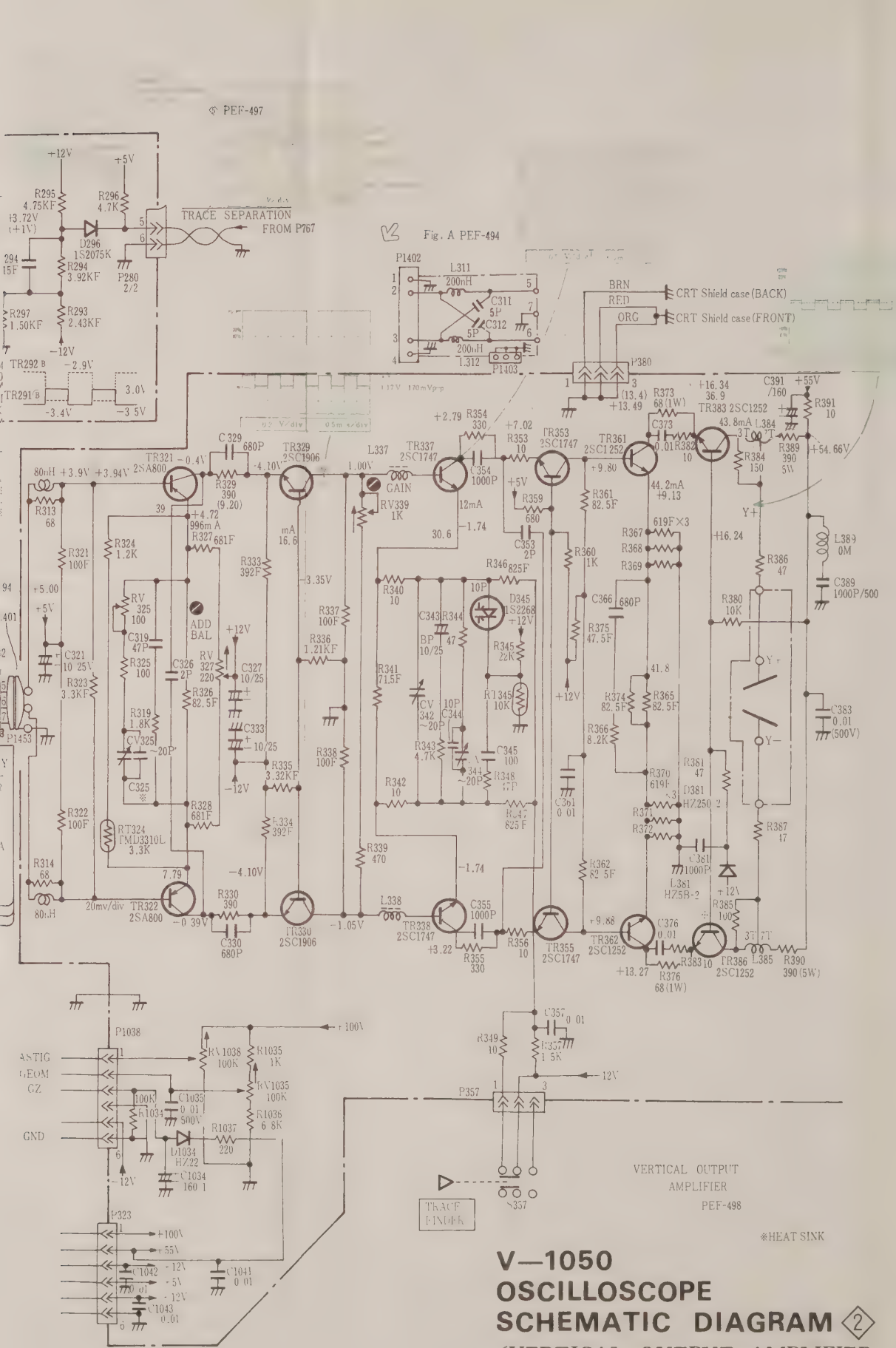
V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ①

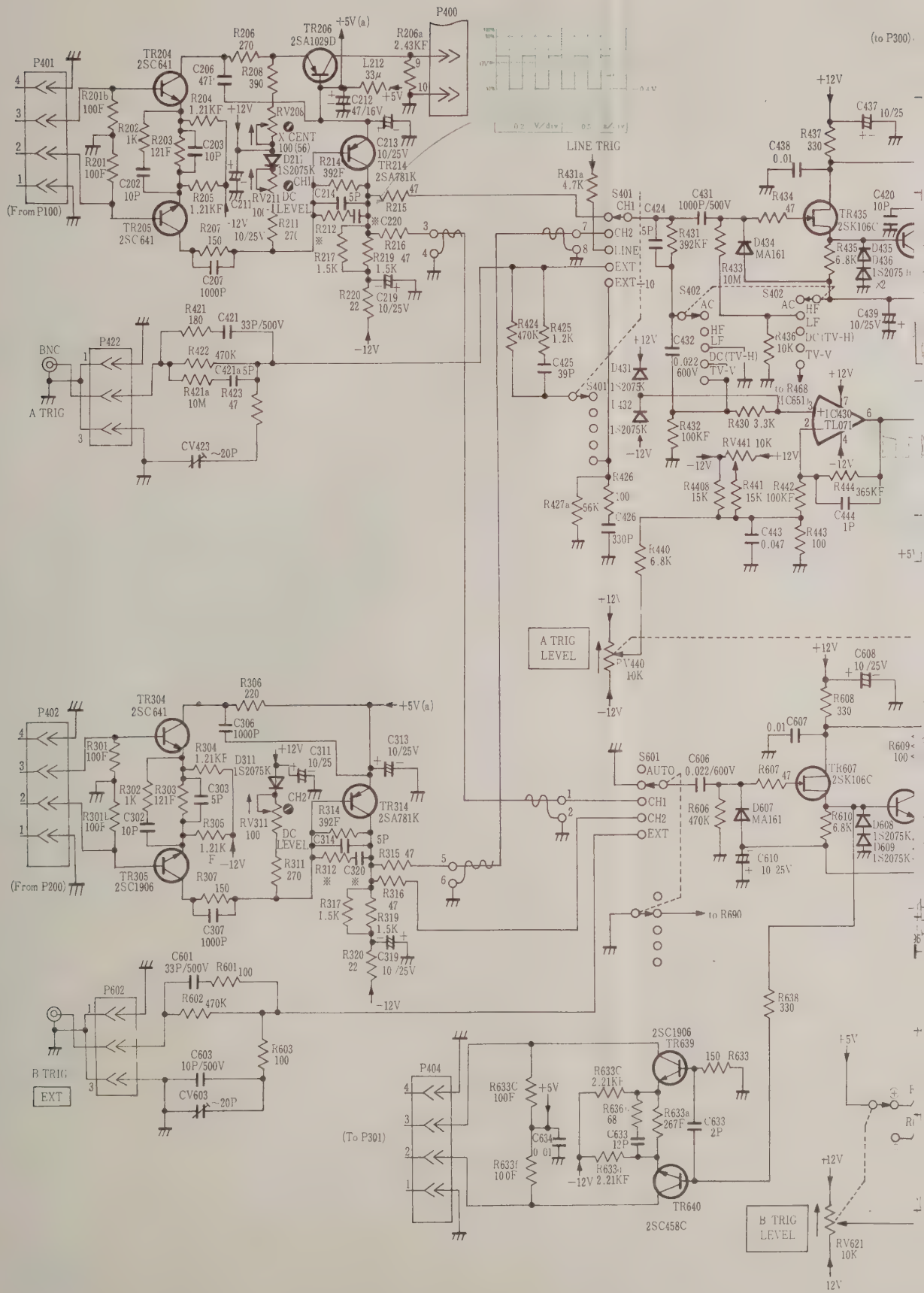
〔VERTICAL PREAMPLIFIER〕

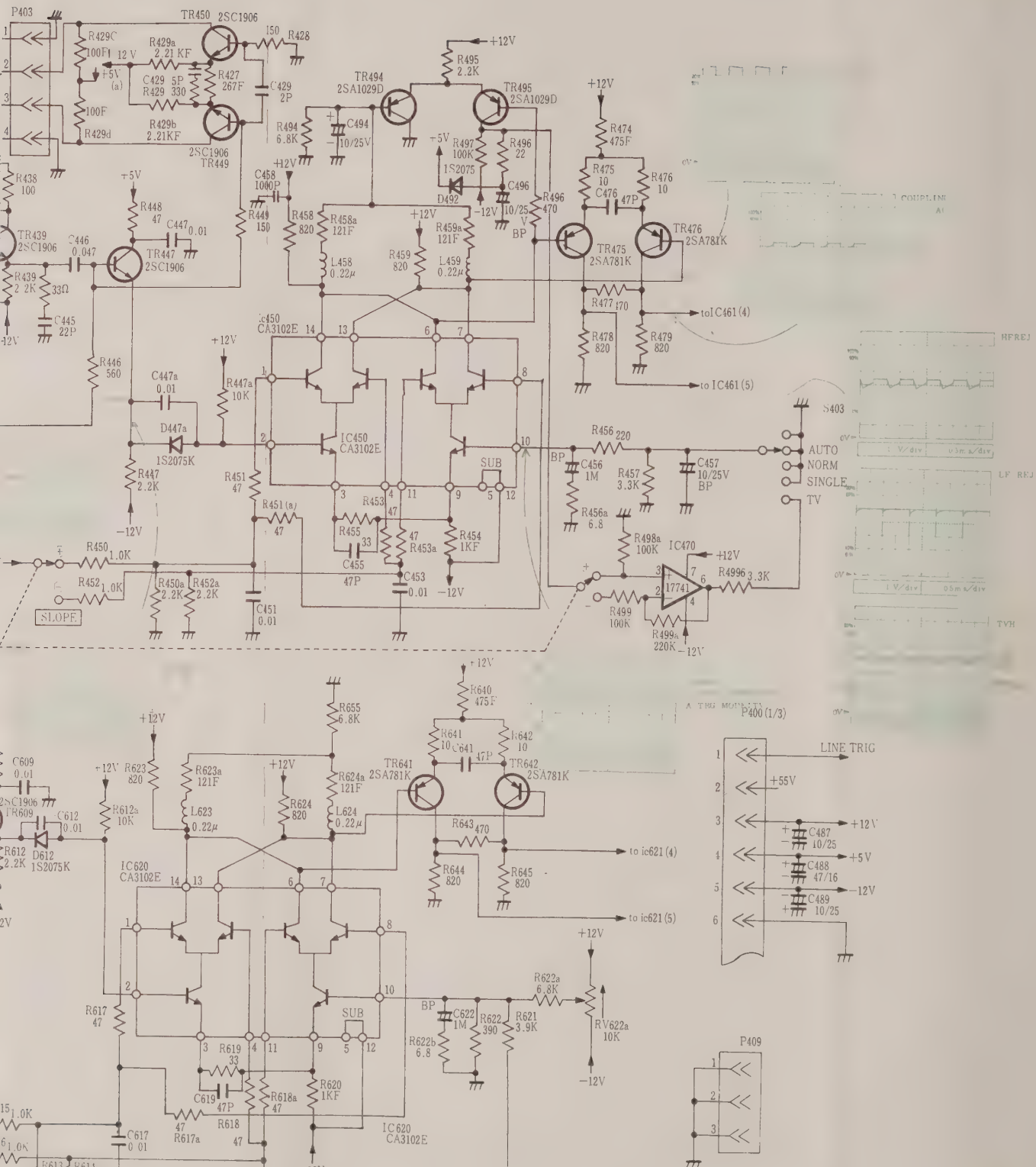

D221~228; 1S2075K
D246~249; 1S2075K
D262~265; 1S2075K
TRACE SEP
+12V
-12V
TR73 c
TR74 c
TR173 c
TR174 c
CH1
CH2
C221 22P
C222 22P
C225 22P
C226 22P
R73a 220
C73a 3P
R221 47
R222 47
R225 47
R226 47
D221
D222
D225
D226
10μ L221A
1K R221A
L225a 10μ
R225a 1K
D233
D224
D227
D228
D249
D248
D265
D264
+0.180 (+4.2div)
−0.175 (−4.5div)
C287 0.01
P287
RV298 20K
R287 10K
R288 150
C288 ※
TR285 2SC1906
R285 100
R283 392F
R284 392F
TR286 2SC1906
R286a 150
R286 100
+4.54
TR291 2SC458C
−3.0V (−3.5V)
−2.1V
R291 825F
R292 4.75KF
TR292 2SC458C
R291b 825F
R289 1.50KF
R290 3.32KF
+1.81V
R271 221F
+3.0V
+2.96
R279 86.6F
−3.4V (−2.9V)
L279 0.47μH
+3.91
TR271 2SC1747
+1.07
R271a 150
R269 2.67KF
R270 2.67KF
R273 1.00KF
S279
BW LIMIT
C278 15P
C279 82P
C276 10/25
R276 33
R274 1.00KF
C277
R275 1.00KF
−10.78
TR272 2SC1747
C271 5P
R278 750F
C281 5P
R281 330
R272 221F
+2.97
R280 86.6F
L280 0.47μH
+1.8V
P279
DELAY EQUALIZER
PEF-4
DLH
P140
R277 750F
A POS (TRIG VIEW)
B POS (TRIG VIEW)
FROM P403
P300
FROM P404
P301
R231 2.7K
RV231 4.7K
R232 2.2K
R233 120
R234 120
+5V
C237 ※
RV237 ※
R238
C238
C233 1000P
R241 1.21KF
R237 182F
R242 1.21KF
TR243 2SA781K
R243 220
C243 1000P
TR244 2SA781K
C244 1000P
R244 220
L246a
R246a
D246
D247
R248 1.8K
RV249 4.7K
R249 2.2K
C250 1000P
R250 120
C254
RV254 ※
R255
R256
R254 1.21KF
1.82F
R257 1.21KF
C255
R252 120
TR258 2SA781K
R258 220
C258 1000P
TR259 2SA781K
C259 1000P
R259 220
L262a
R262a
D262
D263
IC245
LS09
D269
D272
D273
D278
D279
D269 ~ D272; 1S2075K
D272~273; 1S2075K
D278~9 ; 1S2075K
Fig.
P449
−11.7V when add
R282 22
+5V
IC281 74LS109A
C282 10/25
P280 1/2
IC281-a
IC281-b
TLS109A
D280 1S2075K
R245 22
IC245 74LS09
C245 10/25
D283 1S2075K
TR265 2SA1029D
TR268 2SC641KC
R265 2.2K
+2V
R268 10K
R266 10K
R267 6.8K
CH SW
CHOP CONT
V-MODE
S282
S281
CH1
CH2
ALT
CHOP
ADD
TRIG VIEW
Multi trace
D281 1S2075K
D282 1S2075K
D284 1S2075K
P80
+55V
C215 0.01 500V
+12V
C211 10/25V
+5V
C212 47/16
12V
C213 10/25V
C214 10/25V
GND



V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ②

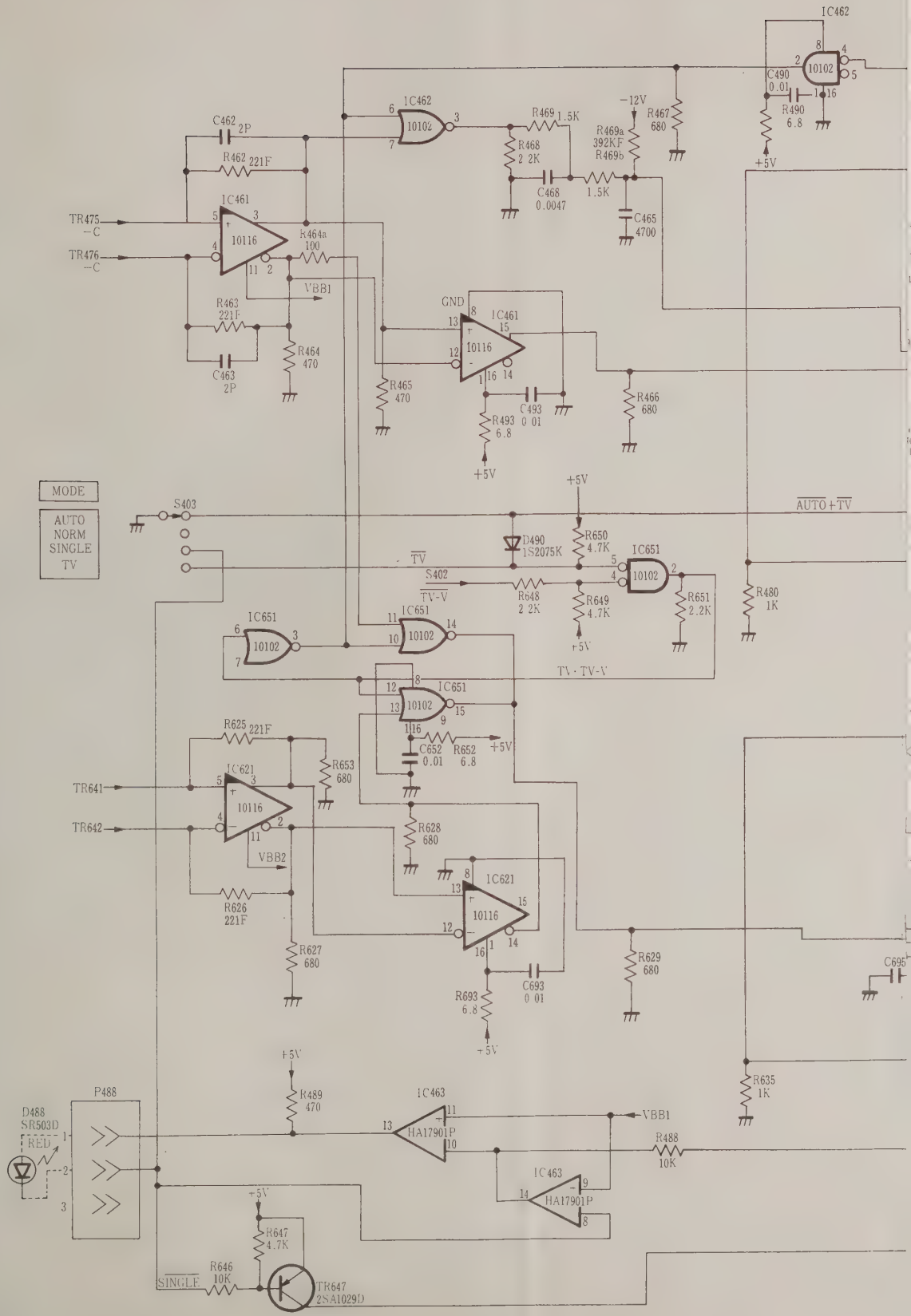
〔VERTICAL OUTPUT AMPLIFIER & CHANNEL SWITCH〕

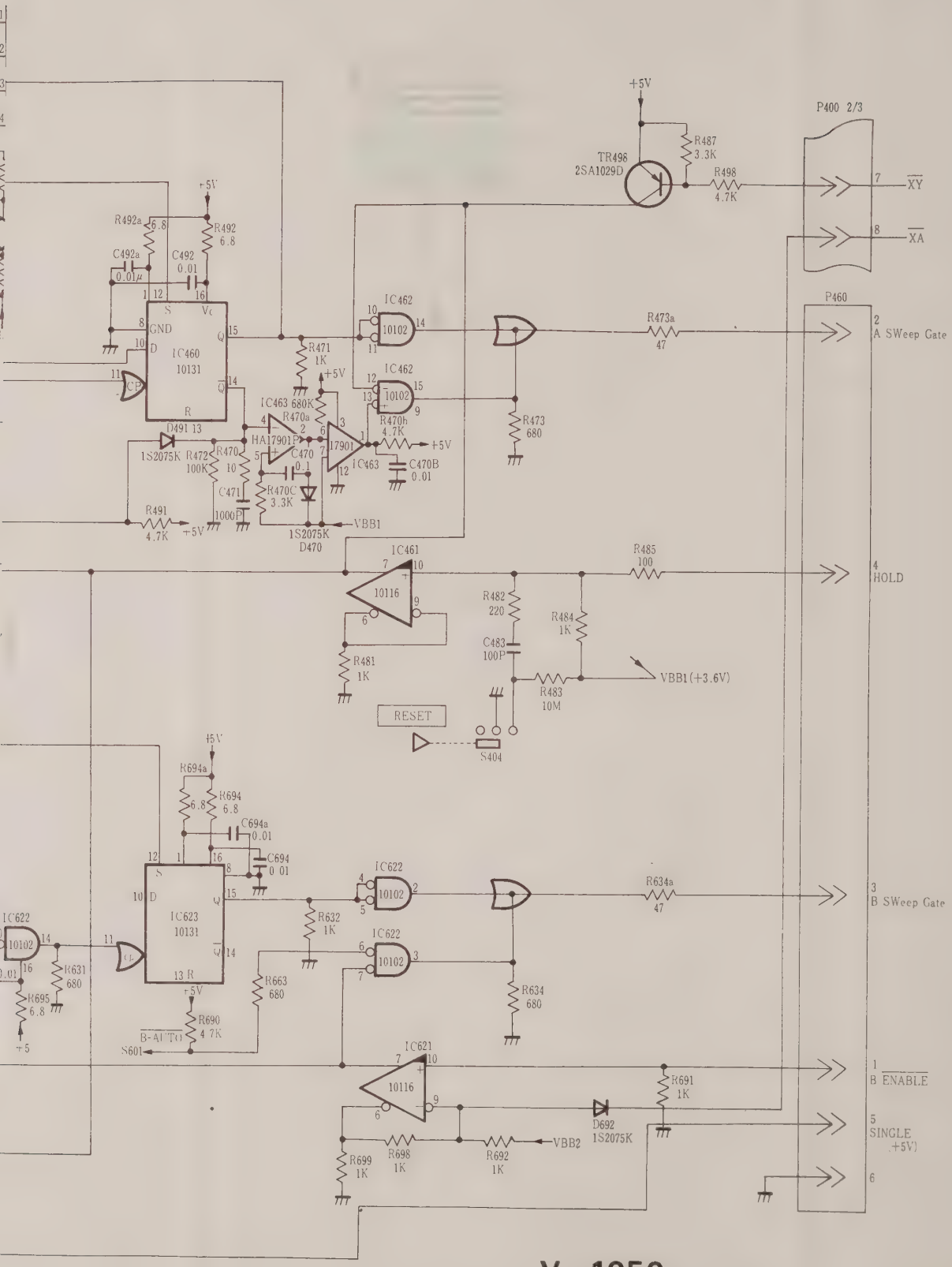

P400
(to P300)
P401
(From P100)
TR204 2SC641
TR205 2SC641
TR206 2SA1029D
+5V(a)
R206 270
R206a 2.43KF
L212 33μ
C212 47/16V
+5V
R208 390
C206 47P
R204 1.21KF
+12V
RV206 X CENT 100(56)
D211 1S2075K
CH1 DC LEVEL
RV211 10K
R211 27(
R212 ※
R214 392F
C214 5P
TR214 2SA781K
C213 10/25V
R215 47
※C220
R216 1.5K
R219 47
R220 22
C219 10/25V
-12V
R207 150
C207 1000P
R201 100F
R202 1K
R203 121F
C203 10P
C202 10P
C211 10(
R205 1.21KF
-12V 10/25V
LINE TRIG
R431a 4.7K
S401 CH1 CH2 LINE EXT
C424 5P
C431 1000P/500V
R431 392KF
D434 MA161
R433 10M
R434 47
TR435 2SK106C
R435 6.8K
D435 D436 1S2075K ×2
C420 10P
C438 0.01
R437 330
C437 10/25
S402 AC HF LF DC(TV-H) TV-V
C439 10/25V
R424 470K
R425 1.2K
C425 39P
C432 0.022 600V
R436 10K
D431 1S2075K
D432 1S2075K
R432 100KF
R430 3.3K
RV441 10K
R426
R427a 56K
C426 330P
R4408 15K
R441 15K
R442 100KF
R444 365KF
C444 1P
C443 0.047
R443 100
R440 6.8K
A TRIG LEVEL
RV440 10K
P422
BNC
A TRIG
R421 180
C421 33P/500V
R422 470K
C421a 5P
R421a 10M
R423 47
CV423 ~20P
P402
(From P200)
TR304 2SC641
TR305 2SC1906
R306 220
C306 1000P
R301 100F
R302 1K
R303 121F
C303 5P
R301a 100F
C302 10P
R304 1.21KF
R305 1.21K F
R307 150
C307 1000P
D311 1S2075K
RV311 100
R311 270
R314 392F
TR314 2SA781K
C314 5P
R312 ※
C320 ※
R315 47
R316 47
R317 1.5K
R319 1.5K
C319 10/25V
R320 22
C313 10/25V
S601 AUTO CH1 CH2 EXT
C606 0.022/600V
R607 47
TR607 2SK106C
R606 470K
D607 MA161
R610 6.8K
D608 1S2075K
D609 1S2075K
C610 10/25V
C608 10/25V
R608 330
C607 0.01
to R690
P602
B TRIG
EXT
C601 33P/500V
R601 100
R602 470K
R603 100
C603 10P/500V
CV603 ~20P
P404
(To P301)
2SC1906 TR639
R633C 100F
R633C 2.21KF
R636 68
R633a 267F
C633 2P
C634 0.01
R633f 100F
R633d 2.21KF
TR640 2SC458C
150 R633
R638 330
B TRIG LEVEL
RV621 10K



V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ◇3

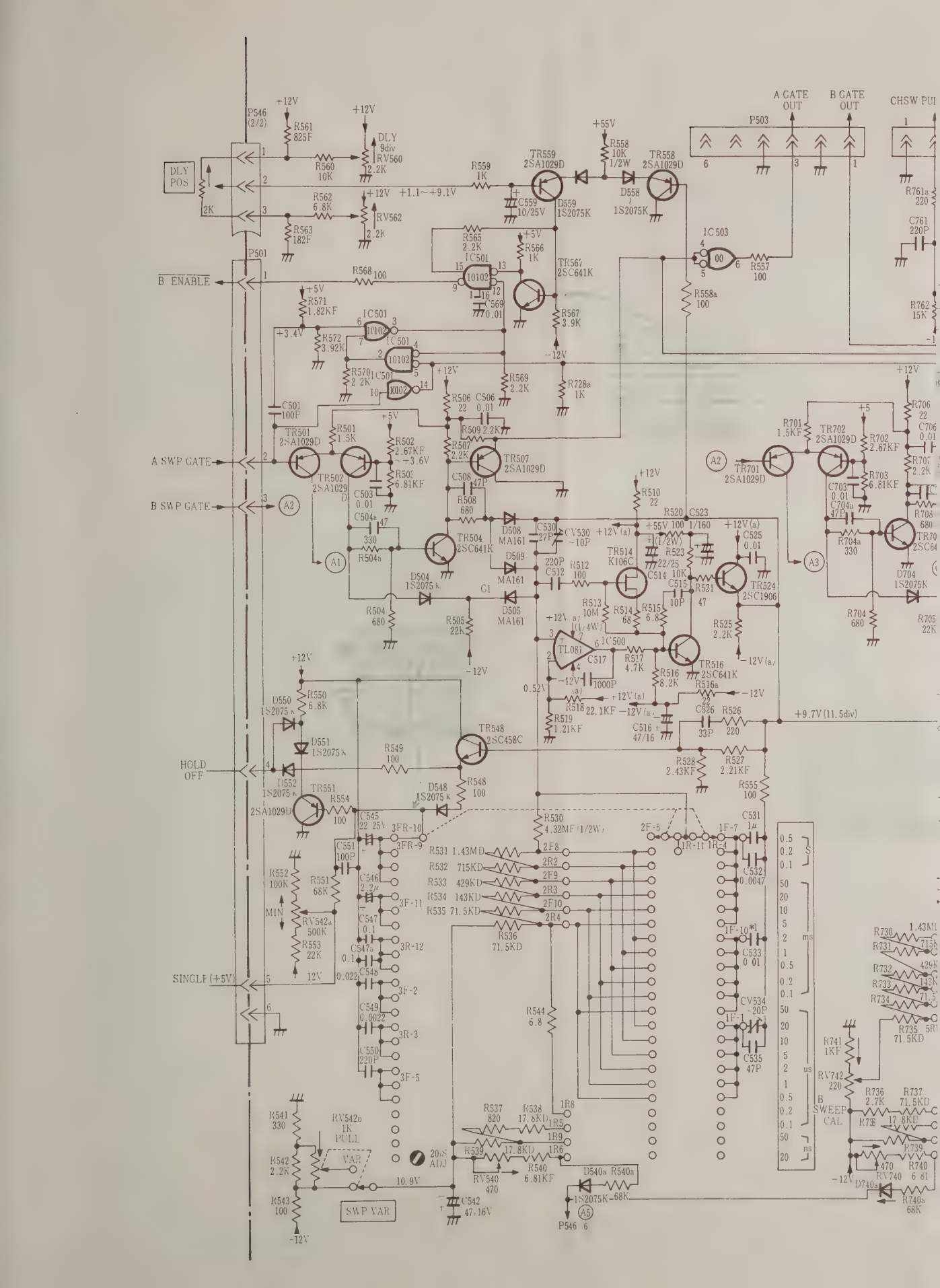
〔TRIGGER (1/2)〕

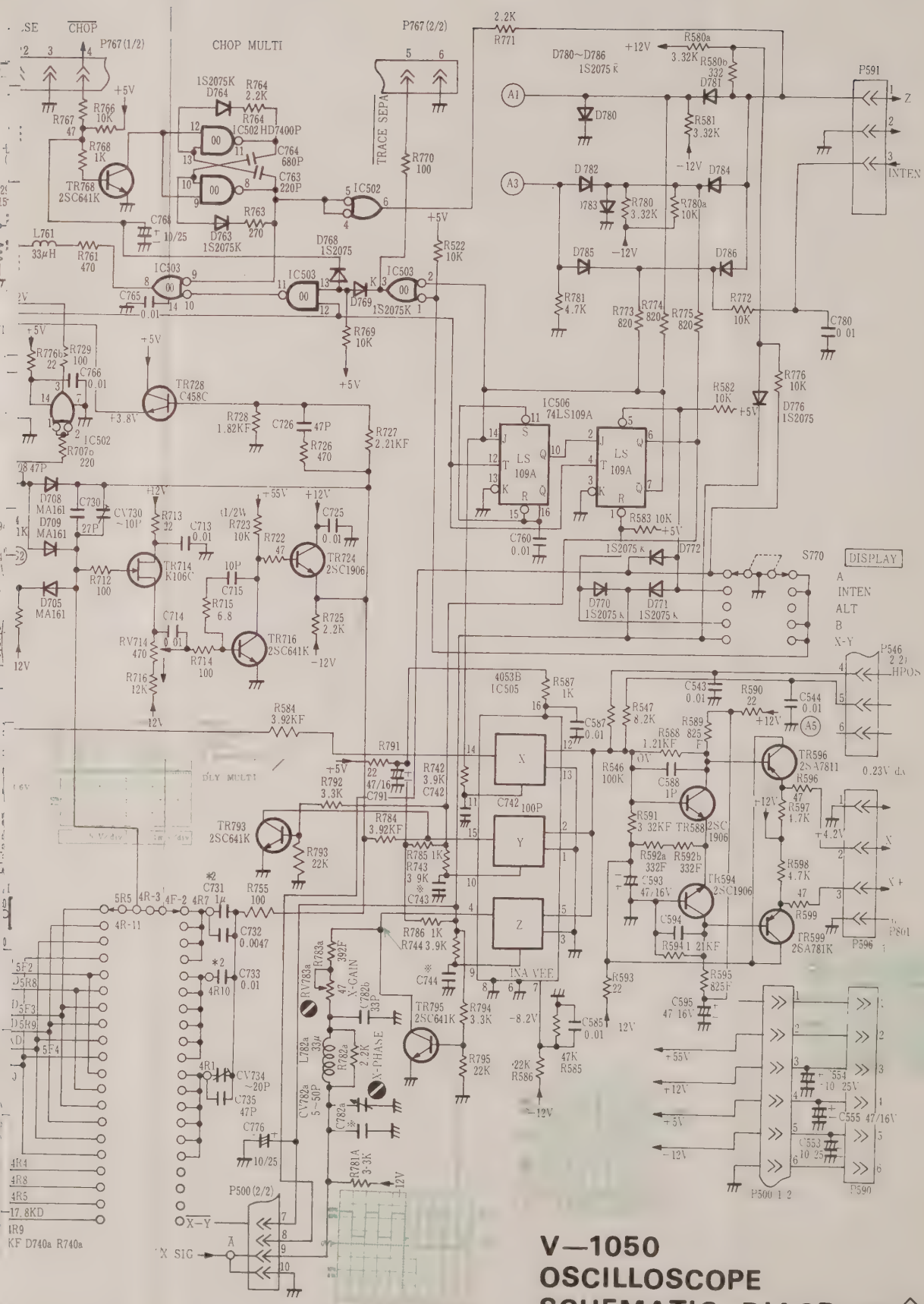

IC462
10102
C490 0.01
R490 6.8
+5V
C462 2P
R462 221F
IC462
10102
R469 1.5K
R468 2.2K
C468 0.0047
1.5K
C465 4700
−12V
R467 680
R469a 392KF
R469b
IC461
10116
TR475 −C
TR476 −C
R464a 100
VBB1
R463 221F
C463 2P
R464 470
GND
IC461
10116
R465 470
C493 0.01
R493 6.8
+5V
R466 680
MODE
AUTO
NORM
SINGLE
TV
S403
+5V
D490 1S2075K
R650 4.7K
IC651
10102
AUTO+TV
TV
S402
TV-V
R648 2.2K
R649 4.7K
R651 2.2K
R480 1K
IC651
10102
IC651
10102
TV · TV-V
IC651
10102
R625 221F
C652 0.01
R652 6.8
+5V
R653 680
IC621
10116
TR641
TR642
VBB2
R628 680
R626 221F
IC621
10116
R627 680
R629 680
C695
R693 6.8
C693 0.01
+5V
+5V
R489 470
P488
D488 SR503D RED
IC463
HA17901P
VBB1
R488 10K
IC463
HA17901P
R635 1K
+5V
R647 4.7K
R646 10K
SINGLE
TR647 2SA1029D



V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ④

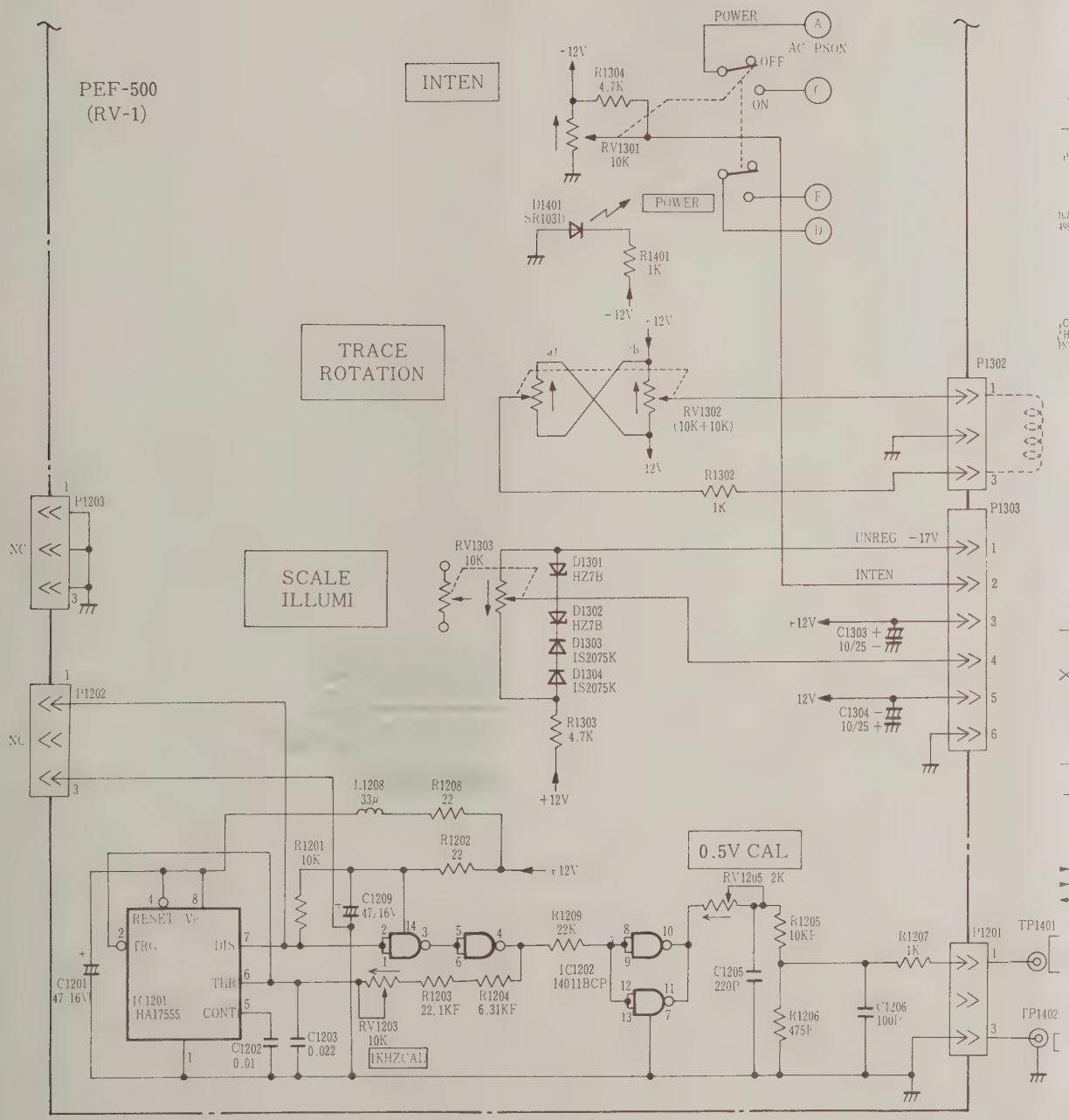
〔TRIGGER (2/2)〕

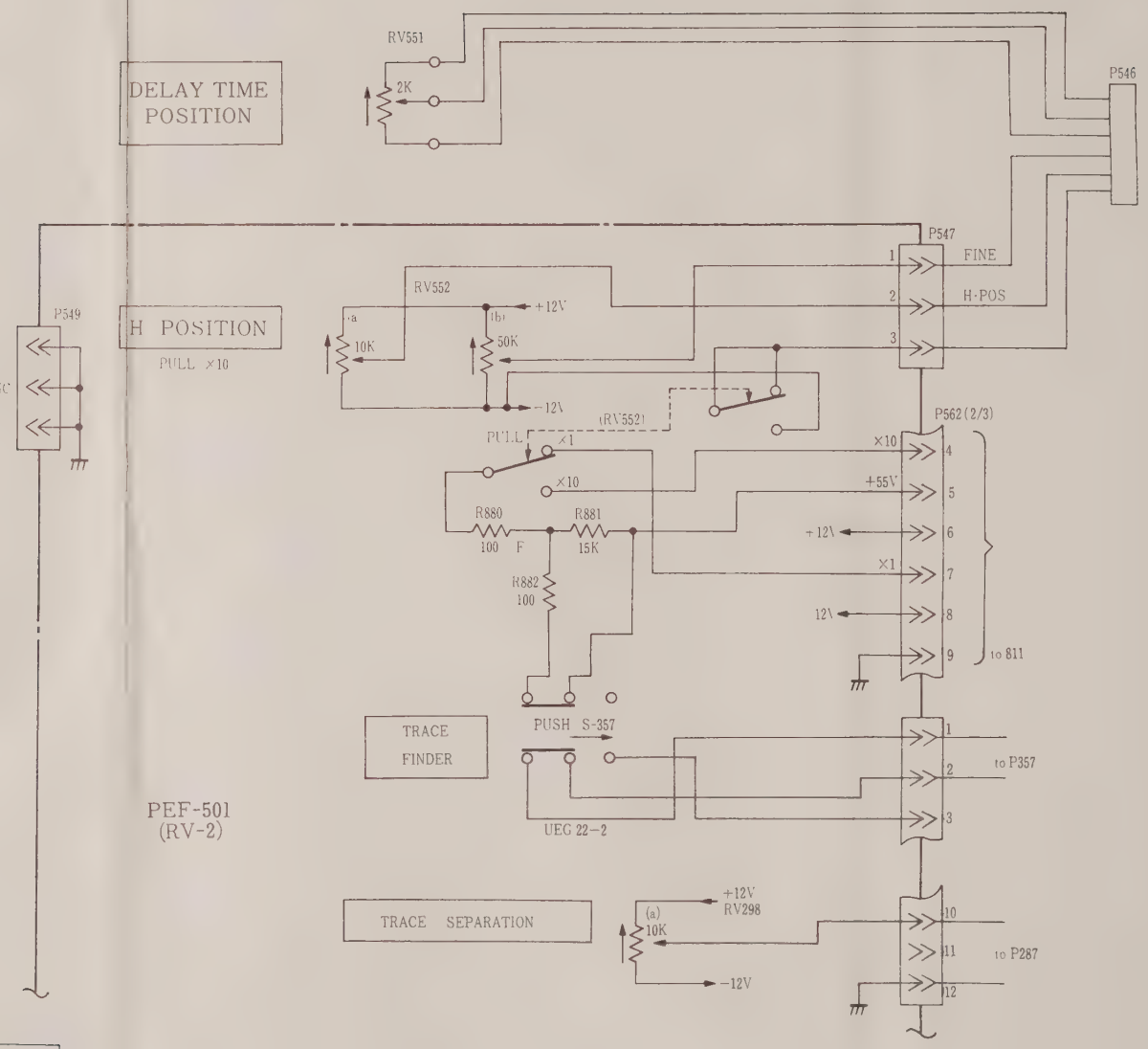

A GATE OUT
B GATE OUT
CHSW PUI
P503
P546 (2/2)
DLY POS
DLY 9div RV560 2.2K
RV562 2.2K
+12V
+1.1~+9.1V
+55V
TR559 2SA1029D
TR558 2SA1029D
D558 1S2075K
D559 1S2075K
C559 10/25V
R559 1K
R558 10K 1/2W
IC 503
R557 100
R558a 100
R761a 220
C761 220P
R762 15K
P501
B ENABLE
R568 100
IC501 10102
TR567 2SC641K
R566 1K
R565 2.2K
C569 0.01
R567 3.9K
R571 1.82KF
R572 3.92K
R570 2.2K
R569 2.2K
R728a 1K
+3.4V
-12V
C501 100P
R506 22
C506 0.01
R509 2.2K
R507 2.2K
TR507 2SA1029D
TR501 2SA1029D
TR502 2SA1029D
R501 1.5K
R502 2.67KF ~3.6V
R503 6.81KF
C503 0.01
C504a 330
R504a
A SWP GATE
B SWP GATE
A1
A2
A3
C508 47P
R508 680
R510 22
R520
C523
C530 27P
CV530 ~10P
D508 MA161
D509 MA161
TR504 2SC641K
TR514 K106C
R523 22/25
C514 10K
C515 10P
R521 47
TR524 2SC1906
C525 0.01
R525 2.2K
220P C512
R512 100
D504 1S2075K
D505 MA161
G1
R504 680
R505 22K
R513 10M
R514 68
R515 6.8
IC500 TL081
C517 1000P
R517 4.7K
R516 8.2K
TR516 2SC641K
R516a 22
R518 22.1KF
R519 1.21KF
C516 47/16
C526 33P
R526 220
+9.7V(11.5div)
R704 680
R705 22K
TR701 2SA1029D
TR702 2SA1029D
R701 1.5KF
R702 2.67KF
R703 6.81KF
C703 0.01
C704a 47P
R704a 330
R706 22
C706 0.01
R707 2.2K
R708 680
D704 1S2075K
D550 1S2075K
R550 6.8K
D551 1S2075K
D552 1S2075K
TR551 2SA1029D
R554 100
TR548 2SC458C
R549 100
R548 100
D548 1S2075K
HOLD OFF
R528 2.43KF
R527 2.21KF
R555 100
C531 1μ
C532 0.0047
C545 22 25V
C551 100P
C546 2.2μ
C547 0.1
C547a 0.1
C548 0.022
C549 0.0022
C550 220P
R530 4.32MF (1/2W)
R531 1.43MD
R532 715KD
R533 429KD
R534 143KD
R535 71.5KD
R536 71.5KD
R544 6.8
C533 0.01
CV534 ~20P
C535 47P
R552 100K
R551 68K
RV542a 500K
R553 22K
MIN
12V
SINGLE (+5V)
R730 1.43M1
R731 715K
R732 429K
R733 143K
R734 71.5K
R735 5R
71.5KD
R741 1KF
RV742 220
R736 2.7K
R737 71.5KD
R738 17.8KF
R739 470
R740 6.81
RV740 6.81
R740a 68K
D740a
B SWEEP CAL
-12V
R541 330
RV542b 1K PULL
VAR
R542 2.2K
R543 100
SWP VAR
20μS ADJ
10.9V
R537 820
R538 17.8KD
R539 17.8KD
R540 6.81KF
RV540 470
D540a R540a
1S2075K 68K
C542 47/16V
P546 6
A5
0.5 0.2 0.1 50 20 10 5 2 1 0.5 0.2 0.1 50 20 μs
0.5 0.2 0.1 50 20 10 5 2 1 0.5 0.2 0.1 50 20 ns
S
ms
us
ns



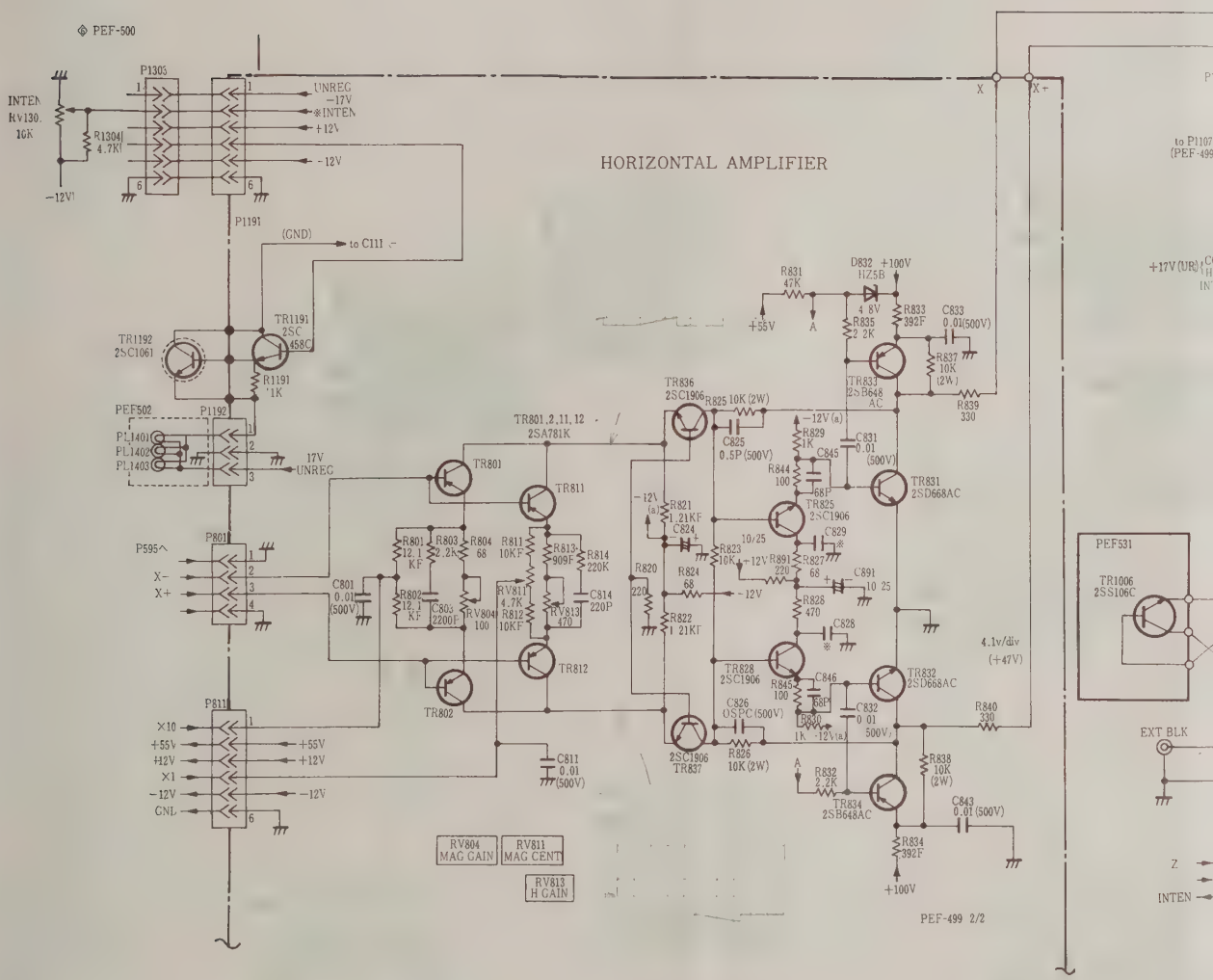
V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ⑤

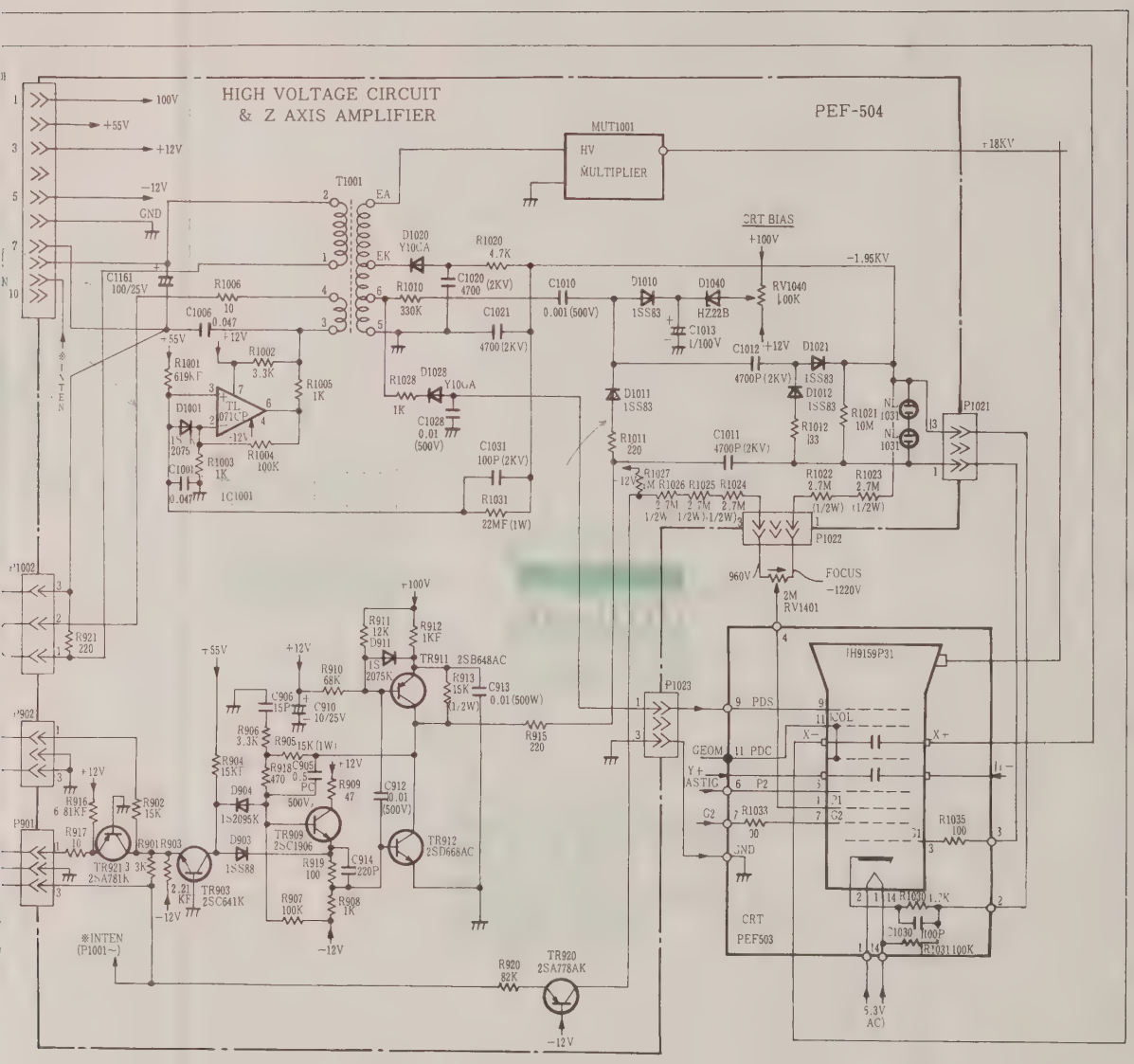
[SWEEP GENERATOR]


PEF-500
(RV-1)
INTEN
TRACE
ROTATION
SCALE
ILLUMI
0.5V CAL
POWER
AC PSON
OFF
ON
-12V
R1304
4.7K
RV1301
10K
D1401
SR103D
R1401
1K
RV1302
(10K+10K)
R1302
1K
P1302
P1303
P1203
P1202
RV1303
10K
D1301
HZ7B
D1302
HZ7B
D1303
IS2075K
D1304
IS2075K
R1303
4.7K
+12V
UNREG -17V
INTEN
C1303 + 10/25 -
C1304 - 10/25 +
L1208
33μ
R1208
22
R1201
10K
R1202
22
C1209
47 16V
IC1201
HA17555
RESET
TRG
DIS
THR
CONT
C1201
47 16V
C1202
0.01
C1203
0.022
RV1203
10K
1KHZCAL
R1203
22.1KF
R1204
6.31KF
IC1202
14011BCP
R1209
22K
RV1205 2K
R1205
10KF
C1205
220P
R1206
475F
R1207
1K
C1206
100P
P1201
TP1401
TP1402



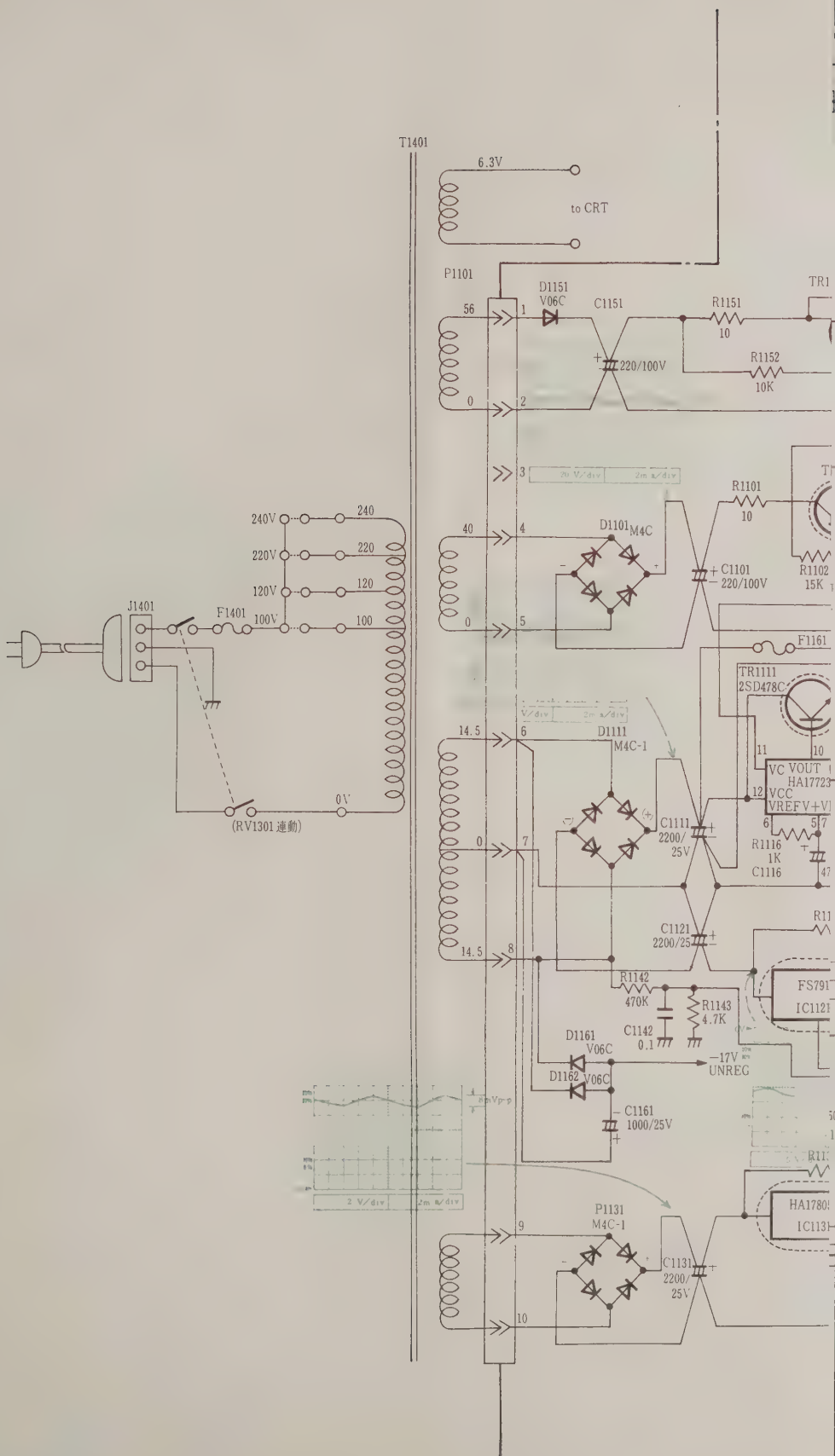
V—1050
OSCILLOSCOPE
SCHEMATIC DIAGRAM ⑥
〔CALIBRATOR & FRONT PANEL CONTROLS〕

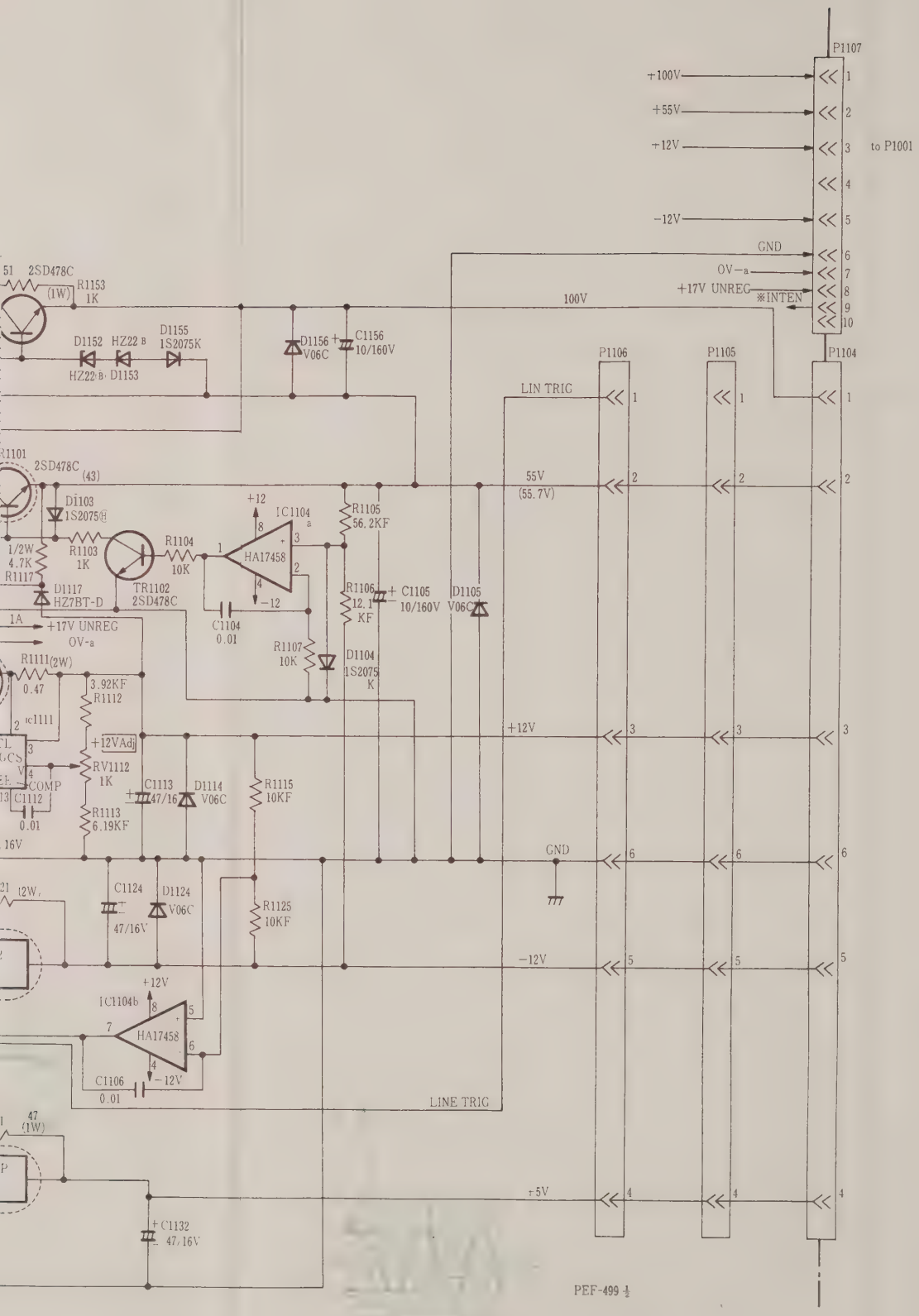

PEF-500
HORIZONTAL AMPLIFIER
P1305
UNREG −17V
※INTEN
+12V
−12V
INTEN RV130 10K
R1304 4.7KF
−12V
P1191
(GND)
to C111
TR1191 2SC458C
TR1192 2SC1061
R1191 1K
PEF502
P1192
PL1401
PL1402
PL1403
17V UNREG
P801
P595
X−
X+
P811
×10
+55V
+12V
×1
−12V
GND
TR801,2,11,12 2SA781K
TR801
TR811
TR802
TR812
R801 12.1 KF
R803 2.2K
R804 68
R811 10KF
R813 909F
R814 220K
R802 12.1 KF
C803 2200P
RV804 100
RV811 4.7K
R812 10KF
RV813 470
C814 220P
C801 0.01 (500V)
C811 0.01 (500V)
RV804 MAG GAIN
RV811 MAG CENT
RV813 H GAIN
TR836 2SC1906
R825 10K (2W)
C825 0.5P (500V)
R821 1.21KF
C824
R823 10K
R820 220
R824 68
R822 1.21KF
TR828 2SC1906
C826 OSPC (500V)
R826 10K (2W)
2SC1906 TR837
R831 47K
+55V
D832 HZ5B
4.8V
R835 2.2K
R833 392F
C833 0.01 (500V)
R837 10K (2W)
TR833 2SB648 AC
R839 330
−12V (a)
R829 1K
C831 0.01 (500V)
C845
R844 100
68P
TR831 2SD668AC
TR825 2SC1906
C829
R827
R891 220
68
C891 10/25
R828 470
C828
TR832 2SD668AC
C846
R845 100
68P
C832 0.01 500V
R840 330
R838 10K (2W)
R832 2.2K
TR834 2SB648AC
C843 0.01 (500V)
R834 392F
+100V
X
X+
4.1v/div (+47V)
PEF531
TR1006 2SS106C
EXT BLK
Z
INTEN
PEF-499 2/2



V—1050
OSCILLOSCOPE
SCHEMATIC DIAGRAM ⑦

(HORIZONTAL AMPLIFIER,
Z-AXIS AMPLIFIER
& HIGH VOLTAGE CIRCUITS)

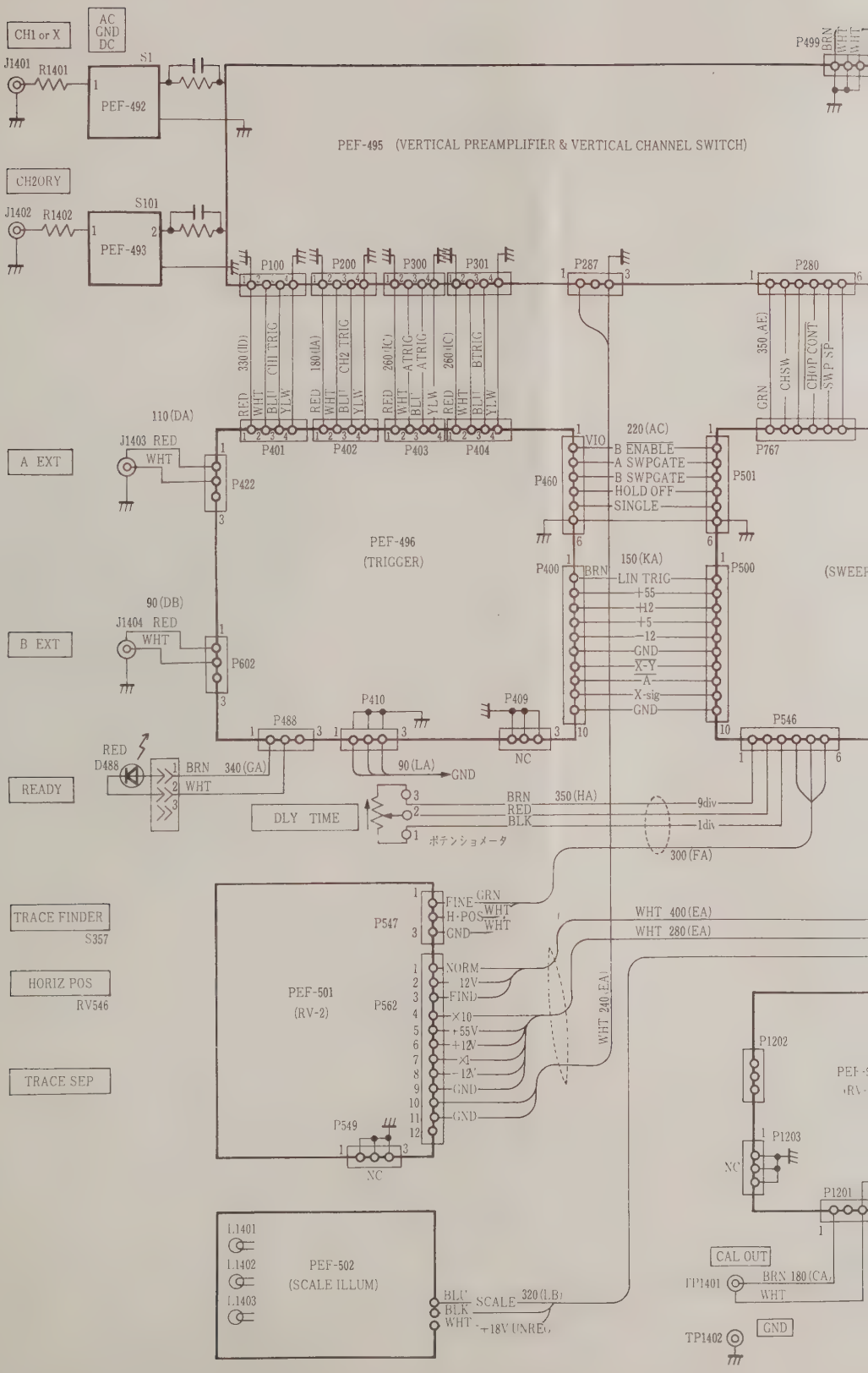

T1401
6.3V
to CRT
P1101
D1151
V06C
C1151
R1151
10
220/100V
R1152
10K
56
0
1
2
3
4
5
40
R1101
10
D1101
M4C
C1101
220/100V
R1102
15K
F1161
TR1111
2SD478C
14.5
6
7
8
D1111
M4C-1
C1111
2200/
25V
R1116
1K
C1116
VC VOUT
VCC
VREF
C1121
2200/25
R1142
470K
R1143
4.7K
C1142
0.1
D1161
V06C
D1162
V06C
−17V
UNREG
C1161
1000/25V
P1131
M4C-1
C1131
2200/
25V
9
10
240V
220V
120V
100V
240
220
120
100
J1401
F1401
0V
(RV1301連動)

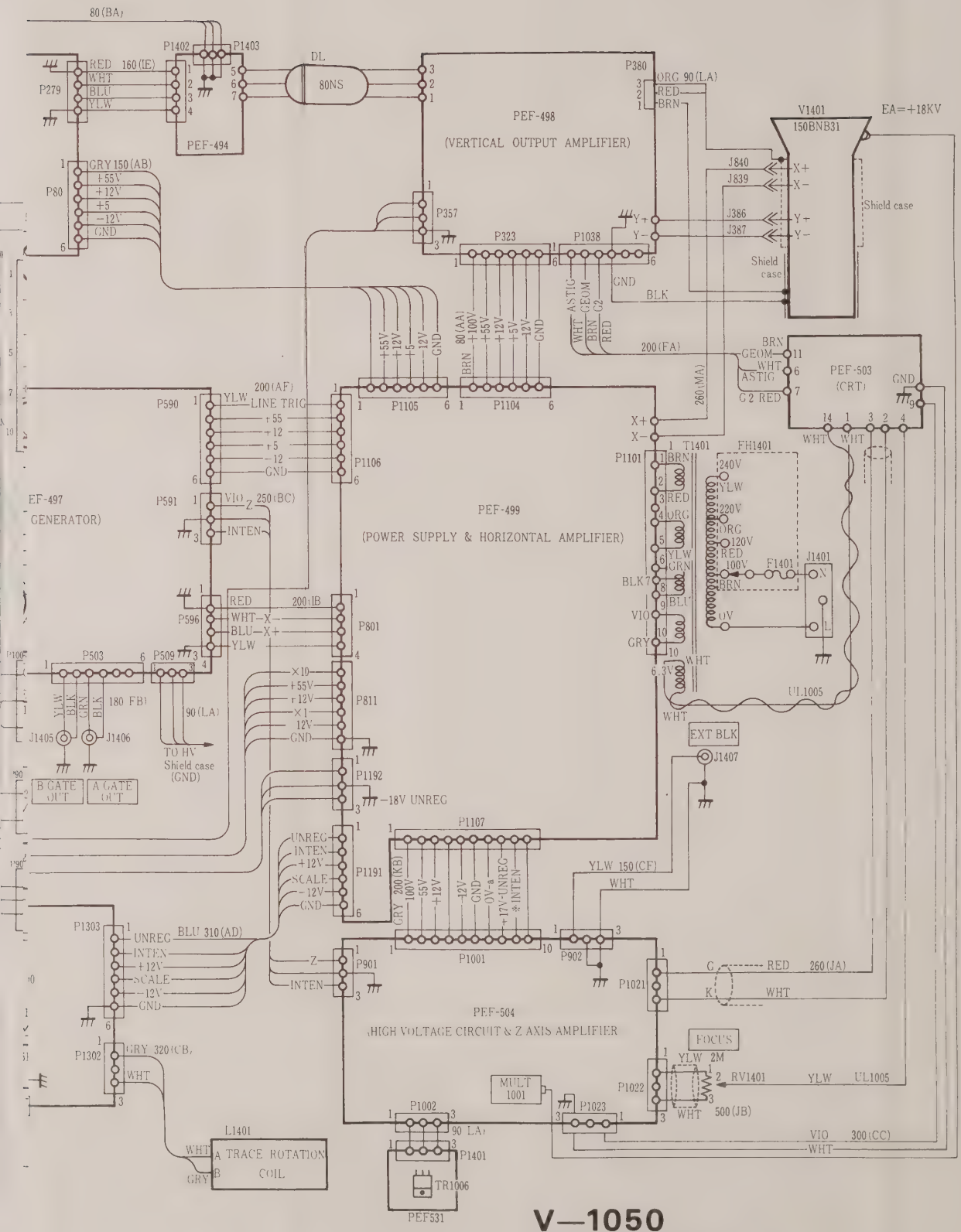


POWER SUPPLY

V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ⑧

〔POWER SUPPLY〕


PEF-495 (VERTICAL PREAMPLIFIER & VERTICAL CHANNEL SWITCH)
CH1 or X
AC
GND
DC
J1401
R1401
S1
PEF-492
CH2ORY
J1402
R1402
S101
PEF-493
P499
BRN
WHT
WHT
P100
P200
P300
P301
P287
P280
330 (ID)
CH1 TRIG
180 (UA)
CH2 TRIG
260 (IC)
A TRIG
260 (IC)
B TRIG
350 (AE)
CHSW
CHOP CONT
SWP SP
RED
WHT
BLU
YLW
GRN
P401
P402
P403
P404
P767
110 (DA)
J1403 RED
WHT
A EXT
P422
PEF-496
(TRIGGER)
220 (AC)
VIO
B ENABLE
A SWPGATE
B SWPGATE
HOLD OFF
SINGLE
P460
P501
150 (KA)
P400
P500
LIN TRIG
+55
+12
+5
−12
GND
X-Y
A
X-sig
GND
(SWEEP
90 (DB)
J1404 RED
WHT
B EXT
P602
P488
P410
P409
NC
P546
RED
D488
BRN
340 (GA)
WHT
90 (LA)
GND
READY
DLY TIME
BRN
350 (HA)
RED
BLK
9div
1div
300 (FA)
ボテンショメータ
TRACE FINDER
S357
HORIZ POS
RV546
TRACE SEP
P547
FINE
H·POS
GND
GRN
WHT
WHT
WHT 400 (EA)
WHT 280 (EA)
PEF-501
(RV-2)
P562
XORM
12V
FIND
×10
+55V
+12V
X1
−12V
GND
GND
WHT 240 (EA)
P549
NC
P1202
P1203
NC
P1201
PEF-502
(SCALE ILLUM)
L1401
L1402
L1403
BLU
BLK
WHT
SCALE
320 (LB)
+18V UNREG
CAL OUT
TP1401
BRN 180 (CA)
WHT
TP1402
GND



V—1050 OSCILLOSCOPE SCHEMATIC DIAGRAM ⑨

〔CONNECTORS〕

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-492~493)

Simbol	Description	Code	Q'ty
C1	C,PLASTIC 600 V22000 PF+-10%	CQX0071	1
C101	C,PLASTIX 600 V22000 PF+-10%	CQX0071	1
C2	C,CERAMIC 50 V 22 PF+-5%	CCC1007	1
C102	C,CERAMIC 50 V 22 PF+-5%	CCC1007	1
J1401	COAX.CON BNC071	JHB0088	1
J1402	COAX.CON BNC071	JHB0088	1
R2	R,CARBON 1/4W 47 OHM +-5%	RCR3020	1
R102	R,CARBON 1/4W 47 OHM +-5%	RCR3020	1
R1401	R,CARBON 1/4W 10 OHM +-5%	RCR3004	1
R1402	R,CARBON 1/4W 10 OHM +-5%	RCR3004	1
S1	SW,SLIDE SSB023 L=9 NS PCB	SSV0042	1
S101	SW,SLIDE SSB023 L=9 NS PCB	SSV0042	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-494)

Simbol	Description	Code	Q'ty
C311	C,CERAMIC 50 V 5 PF+-0.25PF	CCC0999VA	1
C312	C,CERAMIC 50 V 5 PF+-0.25PF	CCC0999VA	1
DL1401	DELAY LINE 758DL 100NS 186OHM	HX8311698	1
L311	COIL FL-3H R22M	TLF0003	1
L312	COIL FL-3H R22M	TLF0003	1
P1402	CONNECTOR 171825-4	JBX0704	1
P1403	CONNECTOR 171825-3	JBX0468	1
PEF-494	PCB PEF-499	H 116458	R

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-495)

Simbol	Description	Code	Q'ty
C3	C,CERAMIC 500 V 5 PF+-0.5PF	CCC0769	1
CV3	C,VARIABLE ECV-1ZW10×93	HX3142155	1
C4	C,CERAMIC 500 V 1000 PF+-10%	CCD0217	1
C9	C,CERAMIC 500 V 10 PF+-0.5PF	CCC0772	1
C10	C,PLASTIC 50 V 3300 PF+-10%	CQA0094	1
C11	C,AL ELYC 25 V 10 UF	CEC0175	1
C13	C,AL ELYC 25 V 10 UF	CEC0175	1
C16	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C17	C,CERAMIC 50 V 22 PF+-5%	CCC1007	1
C18	C,AL ELYC 16 V 220 UF	CEC0165	1
C23	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C24	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C27	C,AL ELYC 16 V 47 UF	CEC0170	1
C35	C,CERAMIC 500 V 0.5 PF+-0.25PF	CCC0111	1
C36	C,CERAMIC 50 V 5 PF+-0.25PF	CCC0999	1
C38	C,AL ELYC 16 V 47 UF	CEC0170	1
C38A	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C42	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C43	C,CERAMIC 50 V 33 PF+-5%	CCC1011	1
C44	C,CERAMIC 50 V 3 PF+-0.25PF	CCC0997	1
C53	C,CERAMIC 50 V 3 PF+-0.25%	CCC0997	1
C57	C,CERAMIC 50 V 8 PF+-0.5PF	CCC1001	1
C58	C,CERAMIC 50 V 22 PF+-5%	CCC1007	1
C63	C,CERAMIC 50 V 10 PF+-0.5%	CCC1002	1
CV63	C,VARIABLE ECV-1ZW20×93	HX3142155	1
C65	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C66	C,CERAMIC 50 V 22 PF+-5%	CCC1007	1
C67	C,CERAMIC 50 V 680 PF+-10%	CCC1365	1
C69	C,CERAMIC 50 V 680 PF+-10%	CCC1365	1

Simbol	Description			Code	Q'ty
C73	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C73A	C,CERAMIC	50 V 3	PF+-0.25PF	CCC0997	1
C74A	C,CERAMIC	50 V 2	PF+-0.25PF	CCC0996	1
C75	C,AL ELYC	25 V 10	UF	CEC0175	1
C75A	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C88	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C90	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C92	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C97	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C103	C,CERAMIC	500 V 5	PF+-0.5PF	CCC0769	1
CV103	C,VARIABLE	ECV-1ZW10×93		HX3142155	1
C104	C,CERAMIC	500 V 1000	PF+-10%	CCD0217	1
C109	C,CERAMIC	500 V 10	PF+-0.5PF	CCC0772	1
C110	C,PLASTIC	50 V 3300	PF+-10%	CQA0094	1
C111	C,AL ELYC	25 V 10	UF	CEC0175	1
C113	C,AL ELYC	25 V 10	UF	CEC0175	1
C116	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C117	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C118	C,AL ELYC	16 V 220	UF	CEC0165	1
C123	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C124	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C127	C,AL ELYC	16 V 47	UF	CEC0170	1
C135	C,CERAMIC	500 V 0.5	PF+-0.25PF	CCC0111	1
C136	C,CERAMIC	50 V 5	PF+-0.25PF	CCC0999	1
C138	C,AL ELYC	16 V 47	UF	CEC0170	1
C138A	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C142	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C143	C,CERAMIC	50 V 33	PF+-5%	CCC1011	1
C144	C,CERAMIC	50 V 3	PF+-0.25PF	CCC0997	1

Simbol	Description			Code	Q'ty
C153	C,CERAMIC	50 V 3	PF+-0.25PF	CCC0997	1
C157	C,CERAMIC	50 V 8	PF+-0.5PF	CCC1001	1
C158	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C163	C,CERAMIC	50 V 10	PF+-0.5%	CCC1002	1
CV163	C,VARIABLE	ECV-1ZW20×93		HX3142155	1
C165	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C166	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C167	C,CERAMIC	50 V 680	PF+-10%	CCC1365	1
C169	C,CERAMIC	50 V 680	PF+-10%	CCC1365	1
C173	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C176	C,AL ELYC	25 V 10	UF	CEC0175	
C177A	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C178A	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C188	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C190	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C192	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C197	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C211	C,AL ELYC	25 V 10	UF	CEC0175	1
C212	C,AL ELYC	16 V 47	UF	CEC0170	1
C213	C,AL ELYC	25 V 10	UF	CEC0175	1
C214	C,AL ELYC	25 V 10	UF	CEC0175	1
C215	C,CERAMIC	500 V10000	PF+-10%	CCD0218	1
C221	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C222	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C225	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C226	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C233	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C243	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C244	C,CERAMIC	50 V 1000	PF+80%-20%	CCC1029	1
C245	C,AL ELYC	25 V 10	UF	CEC0175	1

Simbol	Description	Code	Q'ty
C250	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C258	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C259	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C271	C,CERAMIC 50 V 5 PF+-0.25PF	CCC0999	1
C276	C,AL ELYC 25 V 10 UF	CEC0175	1
C277	C,AL ELYC 25 V 10 UF	CEC0175	1
C278	C,CERAMIC 50 V 15 PF+-5%	CCC1004	1
C279	C,CERAMIC 50 V 82 PF+-5%	CCC1032	1
C281	C,CERAMIC 50 V 5 PF+-0.25PF	CCC0999	1
C282	C,AL ELYC 25 V 10 UF	CEC0175	1
C287	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C294	C,CERAMIC 50 V 15 PF+-5%	CCC1004	1
D6	DIODE 1S2075 T-D	HDS0108	1
D15	DIODE 1S2075K	HDS0108	1
D38	DIODE HZ7BT-D	HDH0040	1
D106	DIODE 1S2075 T-D	HDS0108	1
D115	DIODE 1S2075K	HDS0108	1
D138	DIODE HZ7BT-D	HDH0040	1
D221	DIODE 1S2075 T-D	HDS0108	1
D222	DIODE 1S2075 T-D	HDS0108	1
D224	DIODE 1S2075 T-D	HDS0108	1
D225	DIODE 1S2075 T-D	HDS0108	1
D226	DIODE 1S2075 T-D	HDS0108	1
D227	DIODE 1S2075 T-D	HDS0108	1
D228	DIODE 1S2075 T-D	HDS0108	1
D233	DIODE 1S2075 T-D	HDS0108	1
D246	DIODE 1S2075 T-D	HDS0108	1
D247	DIODE 1S2075 T-D	HDS0108	1
D248	DIODE 1S2075 T-D	HDS0108	1
D249	DIODE 1S2075 T-D	HDS0108	1

Simbol	Description		Code	Q'ty
D262	DIODE	1S2075 T-D	HDS0108	1
D263	DIODE	1S2075 T-D	HDS0108	1
D264	DIODE	1S2075 T-D	HDS0108	1
D265	DIODE	1S2075 T-D	HDS0108	1
D269	DIODE	1S2075 T-D	HDS0108	1
D272	DIODE	1S2075 T-D	HDS0108	1
D273	DIODE	1S2075 T-D	HDS0108	1
D278	DIODE	1S2075 T-D	HDS0108	1
D279	DIODE	1S2075 T-D	HDS0108	1
D280	DIODE	1S2075 T-D	HDS0108	1
D281	DIODE	1S2075 T-D	HDS0108	1
D282	DIODE	1S2075 T-D	HDS0108	1
D283	DIODE	1S2075 T-D	HDS0108	1
D284	DIODE	1S2075 T-D	HDS0108	1
D296	DIODE	1S2075 T-D	HDS0108	1
IC6	IC,ANALOG	TL071CP	ILT0041	1
IC106	IC,ANALOG	TL071CP	ILT0041	1
IC245	IC,DIGITAL	HD74LS09P	IDH0680	1
IC281	IC,DIGITAL	HD74LS109AP	IDH0713	1
L71	COIL	FL-3H R47M	TLF0052	1
L74A	CORE	L1-RH0303	HX841221	1
L75A	CORE	L1-RH0303	HX841221	1
L171	COIL	FL-3H R47M	TLF0052	1
L221A	COIL	FL-3H 100K	TLF0028	1
L225A	COIL	FL-3H 100K	TLF0028	1
L246A	COIL	FL-3H 100K	TLF0028	1
L262A	COIL	FL-3H 100K	TLF0028	1
L279	COIL	FL-3H R47M	TLF0052	1
L280	COIL	FL-3H R47M	TLF0052	1
P80	CONNECTOR	171825-6	JBX0470	1

Simbol	Description			Code	Q'ty
P100	CONNECTOR	171825-4		JBX0704	1
P200	CONNECTOR	171825-4		JBX0704	1
P279	CONNECTOR	171825-4		JBX0704	1
P280	CONNECTOR	171825-6		JBX0470	1
P287	CONNECTOR	171825-3		JBX0468	1
P300	CONNECTOR	171825-4		JBX0704	1
P301	CONNECTOR	171825-4		JBX0704	1
PEF495	PCB	PEF-495		116456	1
P499	CONNECTOR	171825-3		JBX0468	1
PEF530	PCB	PEF-499		116458	R
R3	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R4	R,CARBON	1/4W 6.8	OHM +-5%	RCR3003	1
R5	R,METAL	1/4W 500	KOHM +-0.5%	RME0828	1
R6	R,METAL	1/4W 500	KOHM +-0.5%	RME0828	1
R7	R,METAL	1/4W 22.1	KOHM +-1%	RME0680	1
RV7	VR,METAL	CR29R 22	KOHM	8348450	1
R8	R,CARBON	1/4W 6.8	KOHM +-5%	RCR3072	1
R9	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R10	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R11	R,CARBON	1/4W 2.2	KOHM +-5%	RCR3060	1
R12	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R13	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R14	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R15	R,SOLID	1/4W 10	MOHM +-5%	RSE0434	1
R16	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R17	R,CARBON	1/4W 680	OHM +-5%	RCR3048	1
R18	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
R21	R,METAL	1/4W 4.00	KOHM +-0.5%	RME0707	1
R22	R,METAL	1/4W 180	KOHM +-0.5%	RME0829	1
R23	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1

Simbol	Description				Code	Q'ty
R24	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R25	R,METAL	1/4W	16.0	KOHM +-0.5%	RME0830	1
R27	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R28	R,METAL	1/4W	20.0	OHM +-0.5%	RME0831	1
R28B	R,METAL	1/4W	274	OHM+-1%	RME0715	1
R31	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R32	R,METAL	1/4W	562	OHM +-1%	RME0661	1
R33	R,CARBON	1/4W	560	OHM +-5%	RCR3046	1
RV33	VR,METAL	CR29R	470	OHM	HX8348450	1
R34	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R35	R,METAL	1/4W	475	OHM +-0.5%	RME0703	1
R36	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R37	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R38	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R41	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R42	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R43	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
RV43	SW,ROTARY	ATT SW	FOR V-1050 W-RV		H 3142145	1
R44	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R45	R,METAL	1/4W	332	OHM +-1%	RME0658	1
R46	R,CARBON	1/4W	180	OHM +-5%	RCR3034	1
R51	R,METAL	1/4W	150	OHM +-0.5%	RME0709	1
R52	R,METAL	1/4W	75.0	OHM +-0.5%	RME0832	1
R53	R,METAL	1/4W	75.0	OHM +-0.5%	RME0832	1
R55	R,CARBON	1/4W	18	OHM +-5%	RCR3010	1
R57	R,CARBON	1/4W	68	OHM +-5%	RCR3024	1
R58	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R59	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R61	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R62	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1

Simbol	Description			Code	Q'ty
R63	R,CARBON	1/4W 6.8	OHM +-5%	RCR3003	1
RV63	VR,METAL	CR29R 100	OHM	HX8348450	1
R64	R,METAL	1/4W 47.5	OHM +-1%	RME0648	1
R65	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R66	R,CARBON	1/4W 33	OHM +-5%	RCR3016	1
R67	R,CARBON	1/4W 560	OHM +-5%	RCR3046	1
R67A	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R68	R,CARBON	1/4W 560	OHM +-5%	RCR3046	1
R69	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R70	R,METAL	1/4W 4.75	KOHM +-1%	RME0672	1
R70A	R,METAL	1/4W 4.75	KOHM +-1%	RME0672	1
R71	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
RV71	VR,CARBON	EVH-Y13K20B13		RDE0013	1
R72	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
R73	R,METAL	1/4W 825	OHM +-1%	RME0663	1
R73A	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
RV73	VR,METAL	CR29R 22	KOHM	H 8348450	1
R74	R,METAL	1/4W 825	OHM +-1%	RME0663	1
R75	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R75A	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
R82	R,CARBON	1/4W 220	KOHM +-5%	RCR3102	1
R84	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R85	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R88	R,METAL	1/4W 47.5	OHM +-1%	RME0648	1
R90	R,CARBON	1/4W 470	OHM +-5%	RCR3044	1
R91	R,CARBON	1/4W 470	OHM +-5%	RCR3044	1
R92	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R93	R,METAL	1/4W 562	OHM +-1%	RME0661	1
R94	R,METAL	1/4W 562	OHM +-1%	RME0661	1
R95	R,METAL	1/4W 392	OHM +-1%	RME0659	1

Simbol	Description				Code	Q'ty
R96	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R96A	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R97	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R97A	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R98	R,METAL	1/4W	71.5	OHM +-1%	RME0737	1
R98A	R,METAL	1/4W	71.5	OHM +-1%	RME0737	1
R99A	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R99B	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R103	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R104	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R105	R,METAL	1/4W	500	KOHM +-0.5%	RME0828	1
R106	R,METAL	1/4W	500	KOHM +-0.5%	RME0828	1
R107	R,METAL	1/4W	22.1	KOHM +-1%	RME0680	1
RV107	VR,METAL	CR29R	22	KOHM	H 8348450	1
R108	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R109	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R110	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R111	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R112	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R113	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R114	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R115	R,SOLID	1/4W	10	MOHM +-5%	RSE0434	1
R116	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R117	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R118	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R121	R,METAL	1/4W	4.00	KOHM +-0.5%	RME0707	1
R122	R,METAL	1/4W	180	KOHM +-0.5%	RME0829	1
R123	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R124	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R125	R,METAL	1/4W	16	KOHM +-0.5%	RME0830	1

Simbol	Description			Code	Q'ty
R127	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R128	R,METAL	1/4W	20.0 OHM +-0.5%	RME0831	1
R128B	R,METAL	1/4W	274 OHM +-1%	RME0715	1
R131	R,CARBON	1/4W	1.0 KOHM +-5%	RCR3052	1
R132	R,METAL	1/4W	562 OHM +-1%	RME0661	1
R133	R,CARBON	1/4W	560 OHM +-5%	RCR3046	1
RV133	VR,METAL	CR29R	470 OHM	HX8348450	1
R134	R,CARBON	1/4W	3.3 KOHM +-5%	RCR3064	1
R135	R,METAL	1/4W	475 OHM +-0.5%	RME0703	1
R136	R,CARBON	1/4W	220 OHM +-5%	RCR3036	1
R137	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1
R138	R,CARBON	1/4W	1.5 KOHM +-5%	RCR3056	1
R141	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R142	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R143	R,CARBON	1/4W	6.8 OHM +-5%	RCR3003	1
RV143	SW,ROTARY	ATT SW	FOR V-1050 W/RV	H 3142145	R
R144	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R145	R,METAL	1/4W	332 OHM +-1%	RME0658	1
R146	R,CARBON	1/4W	180 OHM +-5%	RCR3034	1
R151	R,METAL	1/4W	150 OHM +-0.5%	RME0709	1
R152	R,METAL	1/4W	75.0 OHM +-0.5%	RME0832	1
R153	R,METAL	1/4W	75.0 OHM +-0.5%	RME0832	1
R155	R,CARBON	1/4W	18 OHM +-5%	RCR3010	1
R157	R,CARBON	1/4W	68 OHM +-5%	RCR3024	1
R158	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R159	R,CARBON	1/4W	10 KOHM +-5%	RCR3076	1
R160	R,CARBON	1/4W	120 OHM +-5%	RCR3030	1
RV160	VR,METAL	CR29R	100 OHM	HX8348450	1
R161	R,METAL	1/4W	2.21 KOHM +-1%	RME0668	1
R162	R,METAL	1/4W	2.21 KOHM +-1%	RME0668	1

Simbol	Description			Code	Q'ty
R163	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
RV163	VR,METAL	CR29R 100	OHM	HX8348450	1
R164	R,METAL	1/4W 68.1	OHM +-1%	RME0650	1
R165	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R166	R,CARBON	1/4W 33	OHM +-5%	RCR3016	1
R167	R,CARBON	1/4W 560	OHM +-5%	RCR3046	1
R167A	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R168	R,CARBON	1/4W 560	OHM +-5%	RCR3046	1
R169	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R170	R,METAL	1/4W 4.75	KOHM +-1%	RME0672	1
R170A	R,METAL	1/4W 4.75	KOHM +-1%	RME0672	1
R171	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
RV171	VR,CARBON	EVH-Y13K20B13		RDE0013	1
R172	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
R173	R,METAL	1/4W 825	OHM +-1%	RME0663	1
RV173	VR,METAL	CR29R 22	KOHM	H 8348450	1
R174	R,METAL	1/4W 825	OHM +-1%	RME0663	1
R175	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R176	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R177	R,CARBON	1/4W 2.2	KOHM +-5%	RCR3060	1
R177A	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R178	R,CARBON	1/4W 2.2	KOHM +-5%	RCR3060	1
R178A	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R182	R,CARBON	1/4W 220	KOHM +-5%	RCR3102	1
R184	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R185	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R188	R,METAL	1/4W 47.5	OHM +-1%	RME0648	1
R190	R,CARBON	1/4W 470	OHM +-5%	RCR3044	1
R191	R,CARBON	1/4W 470	OHM +-5%	RCR3044	1
R192	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1

Simbol	Description				Code	Q'ty
R193	R,METAL	1/4W	562	OHM +-1%	RME0661	1
R194	R,METAL	1/4W	562	OHM +-1%	RME0661	1
R195	R,METAL	1/4W	392	OHM +-1%	RME0659	1
R196	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R196A	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R197	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R197A	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R198	R,METAL	1/4W	71.5	OHM +-1%	RME0737	1
R198A	R,METAL	1/4W	71.5	OHM +-1%	RME0737	1
R199A	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R199B	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R221A	R,CARBON	1/4W	1	KOHM +-5%	RCR3052	1
R221	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R222	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R225A	R,CARBON	1/4W	1	KOHM +-5%	RCR3052	1
R225	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R226	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R231	R,CARBON	1/4W	2.7	KOHM +-5%	RCR3062	1
RV231	VR,METAL	CR29R	4.7	KOHM	HX8348450	1
R232	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R233	R,CARBON	1/4W	120	OHM +-5%	RCR3030	1
R234	R,CARBON	1/4W	120	OHM +-5%	RCR3030	1
R237	R,METAL	1/4W	182	OHM +-1%	RME0655	1
R241	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R242	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R243	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R244	R,CARBON	1/4W	220	OHM +-5%	RCR3012	1
R245	R,CARBON	1/4W	22	OHM +-5%	RCR3036	1
R246A	R,CARBON	1/4W	1	KOHM +-5%	RCR3052	1
R248	R,CARBON	1/4W	1.8	KOHM +-5%	RCR3058	1

Simbol	Description				Code	Q'ty
R249	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
RV249	VR,METAL	CR19R	4.7	KOHM	RDC0003	1
R250	R,CARBON	1/4W	120	OHM +-5%	RCR3030	1
R252	R,CARBON	1/4W	120	OHM +-5%	RCR3030	1
R254	R,METAL	1/4W	182	OHM +-1%	RME0655	1
R256	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R257	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R258	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R259	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R262A	R,CARBON	1/4W	1	KOHM +-5%	RCR3052	1
R265	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R266	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R267	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R268	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R269	R,METAL	1/4W	2.67	KOHM +-1%	RME0669	1
R270	R,METAL	1/4W	2.67	KOHM +-1%	RME0669	1
R271	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R271A	R,CARBON	1/4W	150	OHM +-5%	RCR3032	1
R272	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R273	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R274	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R275	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R276	R,CARBON	1/4W	33	OHM +-5%	RCR3016	1
R277	R,METAL	1/4W	750	OHM +-1%	RCR0827	1
R278	R,METAL	1/4W	750	OHM +-1%	RME0827	1
R279	R,METAL	1/4W	86.6	OHM +-0.5%	RME0713	1
R280	R,METAL	1/4W	86.6	OHM +-0.5%	RME0713	1
R281	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R282	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R283	R,METAL	1/4W	392	OHM +-1%	RME0659	1

Simbol	Description			Code	Q'ty
R284	R,METAL	1/4W	392 OHM +-1%	RME0659	1
R285	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R286	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R286A	R,CARBON	1/4W	150 OHM +-5%	RCR3032	1
R287	R,CARBON	1/4W	10 KOHM +-5%	RCR3076	1
R288	R,CARBON	1/4W	150 OHM +-5%	RCR3032	1
R289	R,METAL	1/4W	1.50 KOHM +-1%	RME0666	1
R290	R,METAL	1/4W	3.32 KOHM +-1%	RME0670	1
R291	R,METAL	1/4W	825 OHM +-1%	RME0663	1
R291B	R,METAL	1/4W	825 OHM +-1%	RME0663	1
R292	R,METAL	1/4W	4.75 KOHM +-1%	RME0672	1
R293	R,METAL	1/4W	2.43 KOHM +-1%	RME0799	1
R294	R,METAL	1/4W	3.92 KOHM +-1%	RME0671	1
R295	R,METAL	1/4W	4.75 KOHM +-1%	RME0672	1
R296	R,CARBON	1/4W	4.7 KOHM +-5%	RCR3068	1
R297	R,METAL	1/4W	1.50 KOHM +-1%	RME0666	1
S2	SW,ROTARY	ATT SW	FOR V-1050 W/RV	H 3142145	1
S102	SW,ROTARY	ATT SW	FOR V-1050 W/RV	H 3142145	1
S178	SW,PUSH	UEG22-2		HX8311793	1
S279	SW,PB	SPJR TYPE		H 3159320	1
S281	SW,LEVER	SLA225		SSL0056	1
S282	SW,PUSH	UEG22-2		HX8311793	1
TR4	TRANSISTOR	2SK55D		HTK0051	1
TR14	TRANSISTOR	2SC1906		HTC0338	1
TR36	TRANSISTOR	2SC1674K		HTC0557	1
TR38	TRANSISTOR	2SA781K		HTA0099	1
TR42	TRANSISTOR	2SC1906		HTC0338	1
TR58	TRANSISTOR	2SC2026		HTC0400	1
TR66	TRANSISTOR	2SC2026		HTC0400	1
TR73	TRANSISTOR	2SA781K		HTA0099	1

Simbol	Description	Code	Q'ty
TR74	TRANSISTOR 2SA781K	HTA0099	1
TR86	TRANSISTOR 2SC1906	HTC0338	1
TR87	TRANSISTOR 2SC1906	HTC0338	1
TR93	TRANSISTOR 2SA781K	HTA0099	1
TR94	TRANSISTOR 2SA781K	HTA0099	1
TR104	TRANSISTOR 2SK55 D	HTK0051	1
TR114	TRANSISTOR 2SC1906	HTC0338	1
TR136	TRANSISTOR 2SC1674 K	HTC0557	1
TR138	TRANSISTOR 2SA781 K	HTA0099	1
TR142	TRANSISTOR 2SC1906	HTC0338	1
TR158	TRANSISTOR 2SC2026	HTC0400	1
TR166	TRANSISTOR 2SC2026	HTC0400	1
TR173	TRANSISTOR 2SA781 K	HTA0099	1
TR174	TRANSISTOR 2SA781 K	HTA0099	1
TR178	TRANSISTOR 2SA781 K	HTA0099	1
TR179	TRANSISTOR 2SA781 K	HTA0099	1
TR186	TRANSISTOR 2SC1906	HTC0338	1
TR187	TRANSISTOR 2SC1906	HTC0338	1
TR193	TRANSISTOR 2SA781K	HTA0099	1
TR194	TRANSISTOR 2SA781K	HTA0099	1
TR243	TRANSISTOR 2SA781 K	HTA0099	1
TR244	TRANSISTOR 2SA781 K	HTA0099	1
TR258	TRANSISTOR 2SA781 K	HTA0099	1
TR259	TRANSISTOR 2SA781 K	HTA0099	1
TR265	TRANSISTOR 2SA1029 D	HTA0224	1
TR268	TRANSISTOR 2SC641K-C	HTC0192	1
TR271	TRANSISTOR 2SC1747	HTC0496	1
TR272	TRANSISTOR 2SC1747	HTC0496	1
TR285	TRANSISTOR 2SC1906	HTC0338	1
TR286	TRANSISTOR 2SC1906	HTC0338	1

Symbol	Description		Code	Q'ty
TR291	TRANSISTOR	2SC458C	HTC0148	1
TR292	TRANSISTOR	2SC458C	HTC0148	1
	TERMINAL	FT-E-12	ETS0005	1
	TERMINAL	FT-E-12	ETS0005	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-496)

Simbol	Description					Code	Q'ty
C202	C,CERAMIC	50	V	1	PF+-0.25PF	CCC1133	1
C203	C,CERAMIC	50	V	10	PF+-5%	CCC1002	1
C206	C,CERAMIC	50	V	47	PF+-5%	CCC1014	1
C207	C,CERAMIC	50	V	1000	PF+80%-20%	CCC1029	1
C211	C,AL ELYC	25	V	10	UF	CEC0175	1
C212	C,AL ELYC	16	V	47	UF	CEC0170	1
C213	C,AL ELYC	25	V	10	UF	CEC0175	1
C214	C,CERAMIC	50	V	5	PF+-0.25PF	CCC0769	1
C219	C,AL ELYC	25	V	10	UF	CEC0175	1
C302	C,CERAMIC	50	V	1	PF+-0.25PF	CCC1133	1
C303	C,CERAMIC	50	V	5	PF+-0.25PF	CCC1007	1
C306	C,CERAMIC	50	V	1000	PF+80%-20%	CCC1029	1
C307	C,CERAMIC	50	V	1000	PF+80%-20%	CCC1029	1
C311	C,AL ELYC	25	V	10	UF	CEC0175	1
C313	C,AL ELYC	25	V	10	UF	CEC0175	1
C314	C,CERAMIC	50	V	5	PF+-0.25PF	CCC0769	1
C319	C,AL ELYC	25	V	10	UF	CEC0175	1
C420	C,CERAMIC	50	V	10	PF+-0.5PF	CCC1002	1
C421	C,CERAMIC	500	V	33	PF±5%	CCC1225	1
C424	C,CERAMIC	50	V	5	PF+-0.25PF	CCC0999	1
C425	C,CERAMIC	50	V	39	PF+-5%	CCC1013	1
C426	C,CERAMIC	50	V	330	PF+-10%	CCC1160	1
C429	C,CERAMIC	50	V	5	PF+-0.25PF	CCC0999	1
C421A	C,CERAMIC	50	V	5	PF+-0.25PF	CCC0999	1
C431	C,CERAMIC	500	V	1000	PF+-10%	CCD0217	1
C432	C,PLASTIC	600	V	22000	PF+-10%	CQX0071	1
C437	C,AL ELYC	25	V	10	UF	CEC0175	1
C438	C,CERAMIC	50	V	10000	PF+80%-20%	CCC1030	1
C439	C,AL ELYC	25	V	10	UF	CEC0175	1
C443	C,PLASTIC	50	V	47000	PF+-10%	CQA0101	1

Simbol	Description			Code	Q'ty
C444	C,CERAMIC	50 V 1	PF+-0.25PF	CCC1133	1
C445	C,CERAMIC	50 V 22	PF+-5%	CCC1007	1
C446	C,PLASTIC	50 V47000	PF+-10%	CQA0101	1
C447	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C447A	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C451	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C453	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C455	C,CERAMIC	50 V 47	PF+-10%	CCC1014	1
C456	C,AL ELYC	50 V 1	UF B1-POLE	CET0031	1
C457	C,AL ELYC	25 V 10	UF NP	CEC0176	1
C458	C,CERAMIC	50 V 1000	PF+-10%	CCC1029	1
C462	C,CERAMIC	50 V 2	PF+-0.25PF	CCC0996	1
C463	C,CERAMIC	50 V 2	PF+-0.25PF	CCC0996	1
C465	C,PLASTIC	50 V 4700	PF+-10%	CQA0095	1
C468	C,PLASTIC	50 V 4700	PF+-10%	CQA0095	1
C470	C,PLASTIC	50 V10000	PF+-10%	CCC1030	1
C471	C,PLASTIC	50 V 1000	PF+-10%	CQA0091	1
C476	C,CERAMIC	50 V 47	PF+-10%	CCC1014	1
C483	C,CERAMIC	50 V 100	PF+-10%	CCC1025	1
C487	C,AL ELYC	25 V 10	UF	CEC0175	1
C488	C,AL ELYC	16 V 47	UF	CEC0170	1
C489	C,AL ELYC	25 V 10	UF	CEC0175	1
C490	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C492	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C492A	C,PLASTIC	50 V10000	PF+-10%	CQA0097	1
C493	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C494	C,AL ELYC	25 V 10	UF	CEC0175	1
C496	C,AL ELYC	25 V 10	UF NP	CEC0176	1
C601	C,CERAMIC	500 V 33	PF+-5%	CCC1225	1
C603	C,CERAMIC	500 V 10	PF+-10%	CCC0772	1

Simbol	Description	Code	Q'ty
C606	C,PLASTIC 600 V22000 PF+-10%	CQX0071	1
C607	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C608	C,AL ELYC 25 V 10 UF	CEC0175	1
C609	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C610	C,AL ELYC 25 V 10 UF	CEC0175	1
C612	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C617	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C618	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C619	C,CERAMIC 50 V 47 PF+-10%	CCC1014	1
C622	C,AL ELYC 50 V 1 UF	CET0031	1
C633	C,CERAMIC 50 V 12 PF+-0.5PF	CCC1003	1
C634	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C641	C,CERAMIC 50 V 47 PF+-10%	CCC1014	1
C652	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C693	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C694	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C694A	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C695	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
CV423	C,VARIABLE ECV-1ZW 20 × 93	HX3142155	1
CV603	C,VARIABLE ECV-1ZW 20 × 93	HX3142155	1
D211	DIODE 1S2075K	HDS0108	1
D311	DIODE 1S2075K	HDS0108	1
D431	DIODE 1S2075 T-D	HDS0108	1
D432	DIODE 1S2075 T-D	HDS0108	1
D434	DIODE MA161	HDM0051	1
D435	DIODE 1S2075 T-D	HDS0108	1
D436	DIODE 1S2075 T-D	HDS0108	1
D447A	DIODE 1S2075 T-D	HDS0108	1
D470	DIODE 1S2075 T-D	HDS0108	1
D488	DIODE SR503D WITH MOUNT (RED)	HDS0408	1

Simbol	Description	Code	Q'ty
D490	DIODE 1S2075 T-D	HDS0108	1
D491	DIODE 1S2075 T-D	HDS0108	1
D492	DIODE 1S2075 T-D	HDS0108	1
D607	DIODE MA161	HDM0051	1
D608	DIODE 1S2075 T-D	HDS0108	1
D609	DIODE 1S2075 T-D	HDS0108	1
D612	DIODE 1S2075 T-D	HDS0108	1
D692	DIODE 1S2075 T-D	HDS0108	1
IC430	IC,ANALOG TL071CP	ILT0041	1
IC450	IC,ANALOG CA3102E	ILC0069	1
IC460	DIGITAL IC HD10131	IDH0008	1
IC461	IC HD10116	IDH0005	1
IC462	DIGITAL IC HD10102	IDH0002	1
IC463	IC HA17901P	ILH0096	1
IC470	ANALOG IC HA17741PS	ILH0088	1
IC620	IC,ANALOG CA3102E	ILC0069	1
IC621	IC HD10116	IDH0005	1
IC622	DIGITAL IC HD10102	IDH0002	1
IC623	DIGITAL IC HD10131	IDH0008	1
IC651	DIGITAL IC HD10102	IDH0002	1
L212	COIL FL-5H 330K	TLF0019	1
L458	COIL FL-3H R22M	TLF0003	1
L459	COIL FL-3H R22M	TLF0003	1
L623	COIL FL-3H R22M	TLF0003	1
L624	COIL FL-3H R22M	TLF0003	1
P400	CONNECTOR 1-171826-0	JBX1712	1
P401	CONNECTOR 171825-4	JBX0704	1
P402	CONNECTOR 171825-4	JBX0704	1
P403	CONNECTOR 171825-4	JBX0704	1
P404	CONNECTOR 171825-4	JBX0704	1

Simbol	Description	Code	Q'ty
P410	CONNECTOR 171826-3	JBX1710	1
P422	CONNECTOR 171825-3	JBX0468	1
P460	CONNECTOR 171826-6	JBX1711	1
P488	CONNECTOR 171826-3	JBX1710	1
P602	CONNECTOR 171825-3	JBX0468	1
PEF496	PCB PEF-496-497	H 116457	R
R201	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R201B	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R202	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
R203	R,METAL 1/4W 121 OHM +-1%	RME0653	1
R204	R,METAL 1/4W 1.21 KOHM +-1%	RME0665	1
R205	R,METAL 1/4W 1.21 KOHM +-1%	RME0665	1
R206	R,CARBON 1/4W 270 OHM +-5%	RCR3038	1
R207	R,CARBON 1/4W 150 OHM +-5%	RCR3032	1
R208	R,CARBON 1/4W 390 OHM +-5%	RCR3042	1
R206A	R,METAL 1/4W 2.43 KOHM +-1%	RME0799	1
R211	R,CARBON 1/4W 270 OHM +-5%	RCR3038	1
R214	R,METAL 1/4W 392 OHM +-1%	RME0659	1
R215	R,CARBON 1/4W 47 OHM +-5%	RCR3020	1
R216	R,CARBON 1/4W 47 OHM +-5%	RCR3020	1
R217	R,CARBON 1/4W 1.5 KOHM +-5%	RCR3056	1
R219	R,CARBON 1/4W 1.5 KOHM +-5%	RCR3056	1
R220	R,CARBON 1/4W 22 OHM +-5%	RCR3012	1
R301	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R301B	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R302	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
R303	R,METAL 1/4W 121 OHM +-1%	RME0653	1
R304	R,METAL 1/4W 1.21 KOHM +-1%	RME0665	1
R305	R,METAL 1/4W 1.21 KOHM +-1%	RME0665	1
R306	R,CARBON 1/4W 220 OHM +-5%	RCR3036	1

Simbol	Description			Code	Q'ty
R307	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
R311	R,CARBON	1/4W 270	OHM +-5%	RCR3038	1
R314	R,METAL	1/4W 392	OHM +-1%	RME0659	1
R315	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R316	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R317	R,CARBON	1/4W 1.5	KOHM +-5%	RCR3056	1
R319	R,CARBON	1/4W 1.8	KOHM +-5%	RCR3058	1
R320	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
R421	R,CARBON	1/4W 180	OHM +-5%	RCR3034	1
R421A	R,SOLID	1/4W 10	MOHM +-5%	RSE0434	1
R422	R,CARBON	1/4W 470	KOHM +-5%	RCR3104	1
R423	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R424	R,CARBON	1/4W 470	KOHM +-5%	RCR3104	1
R425	R,CARBON	1/4W 1.2	KOHM +-5%	RCR3054	1
R426	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R427	R,METAL	1/4W 267	OHM +-1%	RME0657	1
R427A	R,CARBON	1/4W 56	KOHM +-5%	RCR3094	1
R428	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
R429	R,CARBON	1/4W 330	OHM +-5%	RCR3040	1
R429A	R,METAL	1/4W 2.21	KOHM +-1%	RME0668	1
R429B	R,METAL	1/4W 2.21	KOHM +-1%	RME0668	1
R429C	R,METAL	1/4W 100	OHM +-1%	RME0652	1
R429D	R,METAL	1/4W 100	OHM +-1%	RME0652	1
R430	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R431	R,METAL	1/4W 392	KOHM +-1%	RME0722	1
R431A	R,CARBON	1/4W 4.7	KOHM +-5%	RCR3068	1
R432	R,METAL	1/4W 100	KOHM +-1%	RME0688	1
R433	R,SOLID	1/4W 10	MOHM +-5%	RSE0434	1
R434	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R435	R,CARBON	1/4W 6.8	KOHM +-5%	RCR3072	1

Simbol	Description				Code	Q'ty
R436	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R437	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R438	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R439	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R440	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R440B	R,CARBON	1/4W	15	KOHM +-5%	RCR3080	1
R441	R,CARBON	1/4W	15	KOHM +-5%	RCR3080	1
R442	R,METAL	1/4W	100	KOHM +-1%	RME0688	1
R443	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R444	R,METAL	1/4W	365	KOHM +-1%	RME0697	1
R445	R,CARBON	1/4W	33	OHM +-5%	RCR3016	1
R446	R,CARBON	1/4W	560	OHM +-5%	RCR3046	1
R447	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R448	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R449	R,CARBON	1/4W	150	OHM +-5%	RCR3032	1
R450	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R450A	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R451	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R451A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R452	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R452A	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R453	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R453A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R454	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R455	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R456	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R456A	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R457	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R447A	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R458	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1

Simbol	Description				Code	Q'ty
R458A	R,METAL	1/4W	121	OHM +-1%	RME0653	1
R459	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R459A	R,METAL	1/4W	121	OHM +-1%	RME0653	1
R462	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R463	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R464	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R464A	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R465	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R466	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R467	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R468	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R469	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R469A	R,METAL	1/4W	392	KOHM +-1%	RME0722	1
R469B	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R470	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R470A	R,CARBON	1/4W	680	KOHM +-5%	RCR3105	1
R470B	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R470C	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R471	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R472	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R473	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R473A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R474	R,METAL	1/4W	475	OHM +-1%	RME0660	1
R475	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R476	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R477	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R478	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R479	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R480	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R481	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1

Simbol	Description				Code	Q'ty
R482	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R483	R,SOLID	1/4W	10	MOHM +-5%	RSE0434	1
R484	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R485	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R487	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R488	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R489	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R490	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	;
R491	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R492	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R492A	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R493	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R494	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R495	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R496	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R496A	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R497	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R498	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	
R498A	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R499	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R499A	R,CARBON	1/4W	220	KOHM +-5%	RCR3102	1
R499B	R,CARBON	1/4W	3.3	KOHM +-5%	RCR3064	1
R601	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R602	R,CARBON	1/4W	470	KOHM +-5%	RCR3104	1
R603	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R606	R,CARBON	1/4W	470	KOHM +-5%	RCR3104	1
R607	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R608	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R609	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R610	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1

Simbol	Description				Code	Q'ty
R612	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R612A	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R613	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
T614	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R615	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R616	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R617	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R617A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R618	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R618A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R619	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R620	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R621	R,CARBON	1/4W	3.9	KOHM +-5%	RCR3066	1
R622	R,CARBON	1/4W	390	OHM +-5%	RCR3042	1
R622A	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R622B	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R623	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R623A	R,METAL	1/4W	121	OHM +-1%	RME0653	1
R624	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R624A	R,METAL	1/4W	121	OHM +-1%	RME0653	1
R625	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R626	R,METAL	1/4W	221	OHM +-1%	RME0656	1
R627	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R628	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R629	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R631	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R632	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R633	R,CARBON	1/4W	150	OHM +-5%	RCR3032	1
R633A	R,METAL	1/4W	267	OHM +-1%	RME0657	1
R633B	R,CARBON	1/4W	68	OHM +-5%	RCR3024	R

Simbol	Description				Code	Q'ty
R633C	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R633D	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R633E	R,METAL	1/4W	100	OHM +-1%	RME0652	1
R633F	R.METAL	1/4W	100	OHM +-1%	RME0652	1
R634	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R634A	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R635	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R638	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R640	R,METAL	1/4W	475	OHM +-1%	RME0660	1
R641	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R642	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R643	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R644	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R645	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R646	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R647	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R648	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R649	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R650	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R651	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R652	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R653	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R655	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R663	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R690	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R691	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R692	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R693	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R694	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R694A	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1

Simbol	Description	Code	Q'ty
R695	R,CARBON 1/4W 6.8 OHM +-5%	RCR3003	1
R698	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
R699	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
RV208	VR,METAL CR29R 100 OHM	HX8348450	1
RV211	VR,METAL CR29R 100 OHM	HX8348450	1
RV311	VR,METAL CR29R 100 OHM	HX8348450	1
RV440	VR,CARBON EVH-Y13K20B14	RDE0003	1
RV441	VR,METAL CR29R 10 KOHM	HX8348450	1
RV621	VR,CARBON EVH-Y13K20B14	RDE0003	1
RV622A	VR,METAL CR29R 10 KOHM	HX8348450	1
S401	SW,LEVER SLA225	SSL0056	1
S402	SW,LEVER SLA225	SSL0056	1
S403	SW,LEVER SLA225	SSL0056	1
S404	SW,PUSH UEG22	HX8311793	1
S601	SW,LEVER SLA225	SSL0056	1
TR204	TRANSISTOR 2SC641K-C	HTC0192	1
TR205	TRANSISTOR 2SC641K-C	HTC0192	1
TR206	TRANSISTOR 2SA1029 D	HTA0224	1
TR214	TRANSISTOR 2SA781K	HTA0099	1
TR304	TRANSISTOR 2SC641K-C	HTC0192	1
TR305	TRANSISTOR 2SC641K-C	HTC0192	1
TR314	TRANSISTOR 2SA781K	HTA0099	1
TR435	TRANSISTOR 2SK106C	HTK0068	1
TR439	TRANSISTOR 2SC1906	HTC0338	1
TR447	TRANSISTOR 2SC1906	HTC0338	1
TR449	TRANSISTOR 2SC1906	HTC0338	1
TR450	TRANSISTOR 2SC1906	HTC0338	1
TR475	TRANSISTOR 2SA781K	HTA0099	1
TR476	TRANSISTOR 2SA781K	HTA0099	1
TR494	TRANSISTOR 2SA1029 D	HTA0224	1

Simbol	Description		Code	Q'ty
TR495	TRANSISTOR	2SA1029 D	HTA0224	1
TR498	TRANSISTOR	2SA1029 D	HTA0224	1
TR607	TRANSISTOR	2SK106C	HTK0068	1
TR609	TRANSISTOR	2SC1906	HTC0338	1
TR639	TRANSISTOR	2SC1906	HTC0338	1
TR640	TRANSISTOR	2SC1906	HTC0338	1
TR641	TRANSISTOR	2SA781K	HTA0099	1
TR642	TRANSISTOR	2SA781K	HTA0099	1
TR647	TRANSISTOR	2SA1029 D	HTA0224	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-497)

Simbol	Description				Code	Q'ty
C501	C,CERAMIC	50	V 100	PF+-10%	CCC1025	1
C503	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C504A	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C506	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C508	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C512	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1
C514	C,AL ELYC	25	V 22	UF	CEC0180	1
C515	C,CERAMIC	50	V 10	PF+-0.5PF	CCC1002	1
C516	C,AL ELYC	16	V 47	UF	CEC0170	1
C517	C,CERAMIC	50	V 1000	PF+80%-20%	CCC1029	1
C523	C,AL ELYC	160	V 1	UF	CEC0213	1
C525	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C526	C,CERAMIC	50	V 33	PF+-5%	CCC1011	1
C530	C,CERAMIC	50	V 27	PF+-5%	CCC1009	1
C531	C,PLASTIC	100	V 1+0.01	UF+-0.5%	HX3142077	1
C532	C,PLASTIC	50	V 4700	PF+-10%	CQA0095	1
C533	C,PLASTIC	100	V 1+0.01	UF+-0.5%	HX3142077	R
C535	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C542	C,AL ELYC	16	V 47	UF	CEC0170	1
C543	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C544	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C545	C,AL ELYC	25	V 22	UF	CEC0180	1
C546	C,AL ELYC	50	V 2.2	UF	CEC0194	1
C547	C,PLASTIC	50	V 0.1	MF+-10%	CQA0103	1
C547A	C,PLASTIC	50	V 0.1	UF+-10%	CQA0103	1
C548	C,PLASTIC	50	V22000	PF+-10%	CQA0099	1
C549	C,PLASTIC	50	V 2200	PF+-10%	CQA0093	1
C550	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1
C551	C,CERAMIC	50	V 100	PF+-10%	CCC1025	1
C553	C,AL ELYC	25	V 10	UF	CEC0175	1

Simbol	Description				Code	Q'ty
C554	C,AL ELYC	25	V 10	UF	CEC0175	1
C555	C,AL ELYC	16	V 47	UF	CEC0170	1
C559	C,AL ELYC	25	V 10	UF	CEC0175	1
C569	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C585	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C587	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C588	C,CERAMIC	50	V 1	PF+-0.25PF	CCC1133	1
C593	C,AL ELYC	16	V 47	UF	CEC0170	1
C594	C,CERAMIC	50	V 1	PF+-0.25PF	CCC1133	1
C595	C,AL ELYC	16	V 47	UF	CEC0170	1
C703	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C704A	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C706	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C708	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C713	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C714	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C715	C,CERAMIC	50	V 10	PF+-0.5PF	CCC1002	1
C725	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C726	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C730	C,CERAMIC	50	V 27	PF+-5%	CCC1009	1
C731	C,PLASTIC	100	V 1+0.01	UF+-0.5%	HX3142077	1
C732	C,PLASTIC	50	V 4700	PF+-10%	CQA0095	1
C733	C,PLASTIC	100	V 1+0.01	UF+-0.5%	HX3142077	R
C735	C,CERAMIC	50	V 47	PF+-5%	CCC1014	1
C742	C,CERAMIC	50	V 100	PF+-10%	CCC1025	1
C743						
C744						
C760	C,CERAMIC	50	V10000	PF+80%-20%	CCC1030	1
C761	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1
C763	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1

Simbol	Description			Code	Q'ty
C764	C,CERAMIC	50 V 680	PF+-1%	CCC1365	1
C765	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C766	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C768	C,AL ELYC	25 V 10	UF	CEC0175	1
C776	C,AL ELYC	25 V 10	UF	CEC0175	1
C780	C,CERAMIC	50 V10000	PF+80%-20%	CCC1030	1
C782B	C,CERAMIC	50 V 33	PF+-5%	CCC1011	1
C791	C,AL ELYC	16 V 47	UF	CEC0170	1
CV530	C,VARIABLE	ECV-1ZW10×93		HX3142155	1
CV534	C,VARIABLE	ECV-1ZW20×93		HX3142155	1
CV730	C,VARIABLE	ECV-1ZW10×93		HX3142155	1
CV734	C,VARIABLE	ECV-1ZW20×93		HX3142155	1
CV782A	C,VARIABLE	ECV-1ZW50×93		HX3142155	1
D504	DIODE	1S2075	T-D	HDS0108	1
D505	DIODE	MA161		HDM0051	1
D508	DIODE	MA161		HDM0051	1
D509	DIODE	MA161		HDM0051	1
D540A	DIODE	1S2075	T-D	HDS0108	1
D548	DIODE	1S2075	T-D	HDS0108	1
D550	DIODE	1S2075	T-D	HDS0108	1
D551	DIODE	1S2075	T-D	HDS0108	1
D552	DIODE	1S2075	T-D	HDS0108	1
D558	DIODE	1S2075	T-D	HDS0108	1
D559	DIODE	1S2075	T-D	HDS0108	1
D704	DIODE	1S2075	T-D	HDS0108	1
D705	DIODE	MA161		HDM0051	1
D708	DIODE	MA161		HDM0051	1

Simbol	Description			Code	Q'ty
D709	DIODE	MH161		HDM0051	1
D740A	DIODE	1S2075	T-D	HDS0108	1
D763	DIODE	1S2075	T-D	HDS0108	1
D764	DIODE	1S2075	T-D	HDS0108	1
D768	DIODE	1S2075	T-D	HDS0108	1
D769	DIODE	1S2075	T-D	HDS0108	1
D770	DIODE	1S2075	T-D	HDS0108	1
D771	DIODE	1S2075	T-D	HDS0108	1
D772	DIODE	1S2075	T-D	HDS0108	1
D776	DIODE	1S2075	T-D	HDS0108	1
D780	DIODE	1S2075	T-D	HDS0108	1
D781	DIODE	1S2075	T-D	HDS0108	1
D782	DIODE	1S2075	T-D	HDS0108	1
D783	DIODE	1S2075	T-D	HDS0108	1
D784	DIODE	1S2075	T-D	HDS0108	1
D785	DIODE	1S2075	T-D	HDS0108	1
D786	DIODE	1S2075	T-D	HDS0108	1
IC500	IC,ANALOG	TL081CP		ILT0037	1
IC501	DIGITAL IC	HD10102		IDH0002	1
IC502	DIGITAL IC	HD7400P		IDH0177	1
IC503	IC,DIGITAL	HD74LS00P		IDH0467	1
IC505	DIGITAL IC	MC14053BCP		IDM0113	1
IC506	IC,DIGITAL	HD74LS109AP		IDH0713	1
L761	COIL	FL-5H 330K		TLF0019	1
L782A	COIL	FL-5H 330K		TLF0019	1
P500	CONNECTOR	1-171826-0		JBX1712	1
P501	CONNECTOR	171825-6		JBX0470	1
P503	CONNECTOR	171826-6		JBX1711	1
P509	CONNECTOR	171825-3		JBX0468	1
P546	CONNECTOR	171825-6		JBX0470	1

Simbol	Description			Code	Q'ty
P590	CONNECTOR	171826-6		JBX1711	1
P591	CONNECTOR	171825-3		JBX0468	1
P595	CONNECTOR	171825-4		JBX0704	1
P767	CONNECTOR	171826-6		JBX1711	1
PEF497	PCB	PEF-496~497		H 116457	1
PEF497				H 291533	R
R501	R,CARBON	1/4W	1.5 KOHM +-5%	RCR3056	1
R502	R,METAL	1/4W	2.67 KOHM +-1%	RME0669	1
R503	R,METAL	1/4W	6.81 KOHM +-1%	RME0674	1
R504	R,CARBON	1/4W	680 OHM +-5%	RCR3048	1
R504A	R,CARBON	1/4W	330 OHM +-5%	RCR3040	1
R505	R,CARBON	1/4W	22 KOHM +-5%	RCR3084	1
R506	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R507	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1
R508	R,CARBON	1/4W	680 OHM +-5%	RCR3048	1
R509	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1
R510	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R512	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R513	R,SOLID	1/4W	10 MOHM +-5%	RSE0434	1
R514	R,CARBON	1/4W	68 OHM +-5%	RCR3024	1
R515	R,CARBON	1/4W	6.8 OHM +-5%	RCR3003	1
R516	R,CARBON	1/4W	8.2 KOHM +-5%	RCR3074	1
R516A	R,CARBON	1/4W	22 OHM +-5%	RCR3012	1
R517	R,CARBON	1/4W	4.7 KOHM +-5%	RCR3068	1
R518	R,METAL	1/4W	22.1 KOHM +-1%	RME0680	1
R519	R,METAL	1/4W	1.21 KOHM +-1%	RME0665	1
R520	R,CARBON	1/4W	100 OHM +-5%	RCR3028	1
R521	R,CARBON	1/4W	47 OHM +-5%	RCR3020	1
R522	R,CARBON	1/4W	10 KOHM +-5%	RCR3076	1
R523	R,CARBON	1/2W	10 KOHM +-5%	RCR3183	1

Simbol	Description				Code	Q'ty
R525	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R526	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R527	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R528	R,METAL	1/4W	2.43	KOHM +-1%	RME0799	1
R530	R,METAL	1/2W	4.32	MOHM +-1%	RMR3283	1
R531	R,METAL	1/2W	1.43	MOHM +-0.5%	RME0833	1
R532	R,METAL	1/2W	715	KOHM +-0.5%	RME0834	1
R533	R,METAL	1/4W	429	KOHM +-0.5%	RME0699	1
R534	R,METAL	1/4W	143	KOHM +-0.5%	RME0718	1
R535	R,METAL	1/4W	71.5	KOHM +-0.5%	RME0717	1
R536	R,METAL	1/4W	71.5	KOHM +-0.5%	RME0717	1
R537	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1
R538	R,METAL	1/4W	17.8	KOHM +-0.5%	RME0700	1
R539	R,METAL	1/4W	17.8	KOHM +-0.5%	RME0700	1
R540	R,METAL	1/4W	6.81	KOHM +-1%	RME0674	1
R540A	R,CARBON	1/4W	68	KOHM +-5%	RCR3096	1
R541	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R542	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R543	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R544	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R546	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R547	R,CARBON	1/4W	8.2	KOHM +-5%	RCR3074	1
R548	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R549	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R550	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R551	R,CARBON	1/4W	68	KOHM +-5%	RCR3096	1
R552	R,CARBON	1/4W	100	KOHM +-5%	RCR3100	1
R553	R,CARBON	1/4W	22	KOHM +-5%	RCR3084	1
R554	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R555	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1

Simbol	Description				Code	Q'ty
R557	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R558	R,CARBON	1/2W	10	KOHM +-5%	RCR3183	1
R558A	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R559	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R560	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R561	R,METAL	1/4W	825	OHM +-1%	RME0663	1
R562	R,CARBON	1/4W	6.8	KOHM +-5%	RCR3072	1
R563	R,METAL	1/4W	182	OHM +-1%	RME0655	1
R565	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R566	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R567	R,CARBON	1/4W	3.9	KOHM +-5%	RCR3066	1
R568	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R569	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R570	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R571	R,METAL	1/4W	1.82	KOHM +-1%	RME0667	1
R572	R,METAL	1/4W	3.92	KOHM +-1%	RME0671	1
R580A	R,METAL	1/4W	3.32	KOHM +-1%	RME0670	1
R580B	R,METAL	1/4W	332	OHM +-1%	RME0658	1
R581	R,METAL	1/4W	3.32	KOHM +-1%	RME0670	1
R582	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R583	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R584	R,METAL	1/4W	3.92	KOHM +-1%	RME0671	1
R585	R,CARBON	1/4W	47	KOHM +-5%	RCR3092	1
R586	R,CARBON	1/4W	22	KOHM +-5%	RCR3084	1
R587	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R588	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R589	R,METAL	1/4W	825	OHM +-1%	RME0663	1
R590	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R591	R,METAL	1/4W	3.32	KOHM +-1%	RME0670	1
R592A	R,METAL	1/4W	332	OHM +-1%	RME0658	1

Simbol	Description				Code	Q'ty
R592B	R,METAL	1/4W	332	OHM +-1%	RME0658	1
R593	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R594	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R595	R,METAL	1/4W	825	OHM +-1%	RME0663	1
R596	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R597	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R598	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R599	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R701	R,METAL	1/4W	1.50	KOHM +-1%	RME0666	1
R702	R,METAL	1/4W	2.67	KOHM +-1%	RME0669	1
R703	R,METAL	1/4W	6.81	KOHM +-1%	RME0674	1
R704	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R704A	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R705	R,CARBON	1/4W	22	KOHM +-5%	RCR3084	1
R706	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R707B	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R708	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R712	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R713	R,CARBON	1/4W	22	OHM +-5%	RCR3012	1
R714	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R715	R,CARBON	1/4W	6.8	OHM +-5%	RCR3003	1
R716	R,CARBON	1/4W	12	KOHM +-5%	RCR3078	1
R722	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R723	R,CARBON	1/2W	10	KOHM +-5%	RCR3183	1
R725	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R726	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R727	R,METAL	1/4W	2.21	KOHM +-1%	RME0668	1
R728	R,METAL	1/4W	1.82	KOHM +-1%	RME0667	1
R728A	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R729	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1

Simbol	Description				Code	Q'ty
R730	R,METAL	1/2W	1.43	MOHM +-0.5%	RME0833	1
R731	R,METAL	1/2W	715	KOHM +-0.5%	RME0834	1
R732	R,METAL	1/4W	429	KOHM +-0.5%	RME0699	1
R733	R,METAL	1/4W	143	KOHM +-0.5%	RME0718	1
R734	R,METAL	1/4W	71.5	KOHM +-0.5%	RME0717	1
R735	R,METAL	1/4W	71.5	KOHM +-0.5%	RME0717	1
R736	R,CARBON	1/4W	2.7	KOHM +-5%	RCR3062	1
R737	R,METAL	1/4W	71.5	KOHM +-0.5%	RME0717	1
R738	R,METAL	1/4W	17.8	KOHM +-0.5%	RME0700	1
R739	R,METAL	1/4W	17.8	KOHM +-0.5%	RME0700	1
R740	R,METAL	1/4W	6.81	KOHM +-1%	RME0674	1
R740A	R,CARBON	1/4W	68	KOHM +-5%	RCR3096	1
R741	R,METAL	1/4W	1.00	KOHM +-1%	RME0664	1
R742	R,CARBON	1/4W	3.9	KOHM +-5%	RCR3066	1
R743	R,CARBON	1/4W	3.9	KOHM +-5%	RCR3066	1
R744	R,CARBON	1/4W	3.9	KOHM +-5%	RCR3066	1
R755	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R761	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R761A	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R762	R,CARBON	1/4W	15	KOHM +-5%	RCR3080	1
R763	R,CARBON	1/4W	270	OHM +-5%	RCR3038	1
R764	R,CARBON	1/4W	2.2	KOHM +-5%	RCR3060	1
R766	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R767	R,CARBON	1/4W	47	OHM +-5%	RCR3020	1
R768	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R769	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R770	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R771	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R772	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R773	R,CARBON	1/4W	820	OHM +-5%	RCR3050	1

Simbol	Description			Code	Q'ty
R774	R,CARBON	1/4W 820	OHM +-5%	RCR3050	1
R775	R,CARBON	1/4W 820	OHM +-5%	RCR3050	1
R776	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R776B	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
R780	R,METAL	1/4W 3.32	KOHM +-1%	RME0670	1
R780A	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R781	R,CARBON	1/4W 2.7	KOHM +-5%	RCR3062	1
R781A	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R782A	R,CARBON	1/4W 2.2	KOHM +-5%	RCR3060	1
R783A	R,METAL	1/4W 392	OHM +-1%	RME0659	1
R784	R,METAL	1/4W 3.92	KOHM +-1%	RME0671	1
R785	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R786	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R791	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
R792	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R793	R,CARBON	1/4W 22	KOHM +-5%	RCR3084	1
R794	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R795	R,CARBON	1/4W 22	OHM +-5%	RCR3012	1
RV540	VR,METAL	CR29R 470	OHM	HX8348450	1
RV542	VR,CARBON	1kB+500kB	WITH/SW	HX3142080	1
RV560	VR,METAL	CR29R 2.2	KOHM	HX8348450	1
RV562	VR,METAL	CR29R 2.2	KOHM	HX8348450	1
RV714	VR,METAL	CR29R 470	OHM	HX8348450	1
RV740	VR,METAL	CR29R 470	OHM	HX8348450	1
RV742	VR,METAL	CR29R 220	OHM	HX8348450	1
RV783A	VR,METAL	CR29R 470	OHM	HX8348450	1
S501	SW,ROTARY	S21P 3323/2220		HX3142078	1
S770	SW,LEVER	SLA225		SSL0056	1
TR501	TRANSISTOR	2SA1029 D		HTA0224	1
TR502	TRANSISTOR	2SA1029 D		HTA0224	1

Simbol	Description		Code	Q'ty
TR504	TRANSISTOR	2SC641K-C	HTC0192	1
TR507	TRANSISTOR	2SA1029 D	HTA0224	1
TR514	TRANSISTOR	2SK106C	HTK0068	1
TR516	TRANSISTOR	2SC641K-C	HTC0192	1
TR524	TRANSISTOR	2SC1906	HTC0338	1
TR548	TRANSISTOR	2SC458C	HTC0148	1
TR551	TRANSISTOR	2SA1029 D	HTA0224	1
TR558	TRANSISTOR	2SA1029 D	HTA0224	1
TR559	TRANSISTOR	2SA1029 D	HTA0224	1
TR567	TRANSISTOR	2SC641K-C	HTC0192	1
TR588	TRANSISTOR	2SC1906	HTC0338	1
TR594	TRANSISTOR	2SC1906	HTC0338	1
TR596	TRANSISTOR	2SA781K	HTA0099	1
TR599	TRANSISTOR	2SA781K	HTA0099	1
TR701	TRANSISTOR	2SA1029 D	HTA0224	1
TR702	TRANSISTOR	2SA1029 D	HTA0224	1
TR704	TRANSISTOR	2SC641K-C	HTC0192	1
TR714	TRANSISTOR	2SK106C	HTK0068	1
TR716	TRANSISTOR	2SC641K-C	HTC0192	1
TR724	TRANSISTOR	2SC1906	HTC0338	1
TR728	TRANSISTOR	2SC458C	HTC0148	1
TR768	TRANSISTOR	2SC641K-C	HTC0192	1
TR793	TRANSISTOR	2SC641K-C	HTC0192	1
TR795	TRANSISTOR	2SC641K-C	HTC0192	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-498)

Simbol	Description	Code	Q'ty
C319	C,CERAMIC 50 V 47 PF+-5%	CCC1014	1
C321	C,AL ELYC 25 V 10 UF	CEC0175	1
C326	C,CERAMIC 50 V 2 PF+-0.25PF	CCC0996	1
C327	C,AL ELYC 25 V 10 UF	CEC0175	1
C329	C,CERAMIC 50 V 680 PF+-10%	CCC1365	1
C330	C,CERAMIC 50 V 680 PF+-10%	CCC1365	1
C333	C,AL ELYC 25 V 10 UF	CEC0175	1
C343	C,AL ELYC 25 V 10 UF NP	CEC0176	1
C344	C,CERAMIC 50 V 10 PF+-0.5PF	CCC1002	1
C345	C,CERAMIC 50 V 47 PF+-5%	CCC1014	1
C353	C,CERAMIC 50 V 2 PF+-0.25PF	CCC0996	1
C354	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C355	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C357	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C361	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C366	C,CERAMIC 50 V 680 PF+-20%	CCC1365	1
C373	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C376	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C381	C,CERAMIC 50 V 1000 PF+80%-20%	CCC1029	1
C383	C,CERAMIC 500 V10000 PF+-10%	CCD0218	1
C389	C,CERAMIC 500 V 1000 PF	CCC0590	1
C391	C,AL ELYC 160 V 1 UF	CEC0213	1
C1034	C,AL ELYC 160 V 1 UF	CEC0213	1
C1035	C,CERAMIC 500 V10000 PF+-10%	CCD0218	1
C1041	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C1042	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C1043	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
CV325	C,VARIABLE ECV-1ZW 20 × 92	H 3159319	1
CV342	C,VARIABLE ECV-1ZW 20 × 92	H 3159319	1
CV344	C,VARIABLE ECV-1ZW 20 × 92	H 3159319	1

Simbol	Description	Code	Q'ty
D345	DIODE 1S2268	HDS0129	1
D381	DIODE HZ5B T-D	HDH0029	1
D1034	DIODE HZ22	HDH0072	1
J384	PIN FOR CONNECTOR	HX8193940	1
J385	PIN FOR CONNECTOR	HX8193940	1
L337	CORE L1-RH0303	HX841221	1
L338	CORE L1-RH0303	HX841221	1
L384	COIL T-COIL(3T,7T)	H 8354946	1
L385	COIL T-COIL(3T,7T)	H 8354946	1
L389	CORE L1-RH0303	HX841221	1
P323	CONNECTOR 171826-6	JBX1711	1
P357	CONNECTOR 171826-3	JBX1710	1
P380	CONNECTOR 171826-3	JBX1710	1
P1038	CONNECTOR 171826-6	JBX1711	1
PEF498	PCB PEF-495	H 116456	R
R313	R,CARBON 1/4W 68 OHM +-5%	RCR3024	1
R314	R,CARBON 1/4W 68 OHM +-5%	RCR3024	1
R319	R,CARBON 1/4W 1.5 KOHM +-5%	RCR3056	1
R321	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R322	R,METAL 1/4W 100 OHM +-1%	RME0652	1
R323	R,CARBON 1/4W 3.3 KOHM +-5%	RCR3064	1
R324	R,CARBON 1/4W 1.2 KOHM +-5%	RCR3054	1
R325	R,CARBON 1/4W 100 OHM +-5%	RCR3028	1
R326	R,METAL 1/4W 82.5 OHM +-1%	RME0651	1
R327	R,METAL 1/4W 681 OHM +-1%	RME0662	1
R328	R,METAL 1/4W 681 OHM +-1%	RME0662	1
R329	R,CARBON 1/4W 390 OHM +-5%	RCR3042	1
R330	R,CARBON 1/4W 390 OHM +-5%	RCR3042	1
R333	R,METAL 1/4W 392 OHM +-1%	RME0659	1
R334	R,METAL 1/4W 392 OHM +-1%	RME0659	1

Simbol	Description				Code	Q'ty
R335	R,METAL	1/4W	3.32	KOHM +-1%	RME0670	1
R336	R,METAL	1/4W	1.21	KOHM +-1%	RME0665	1
R337	R,METAL	1/4W	100	OHM +-1%	RME0652	1
R338	R,METAL	1/4W	100	OHM +-1%	RME0652	1
R339	R,CARBON	1/4W	470	OHM +-5%	RCR3044	1
R340	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R341	R,METAL	1/4W	71.5	OHM +-1%	RME0737	1
R342	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R343	R,CARBON	1/4W	4.7	KOHM +-5%	RCR3068	1
R344	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R345	R,CARBON	1/4W	22	KOHM +-5%	RCR3084	1
R346	R,METAL	1/4W	825	OHM +-1%	RME0663	1
R347	R,METAL	1/4W	825	OHM +-1%	RME0663	1
R348	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R349	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R353	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R354	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R355	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R356	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R357	R,CARBON	1/4W	1.5	KOHM +-5%	RCR3056	1
R359	R,CARBON	1/4W	680	OHM +-5%	RCR3048	1
R360	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R361	R,METAL	1/4W	82.5	OHM +-1%	RME0651	1
R362	R,METAL	1/4W	82.5	OHM +-1%	RME0651	1
R365	R,METAL	1/4W	82.5	OHM +-1%	RME0651	1
R366	R,CARBON	1/4W	8.2	KOHM +-5%	RCR3074	1
R367	R,METAL	1/4W	619	OHM +-1%	RME0693	1
R368	R,METAL	1/4W	619	OHM +-1%	RME0693	1
R369	R,METAL	1/4W	619	OHM +-1%	RME0693	1
R370	R,METAL	1/4W	619	OHM +-1%	RME0693	1

Simbol	Description			Code	Q'ty
R371	R,METAL	1/4W 619	OHM +-1%	RME0693	1
R372	R,METAL	1/4W 619	OHM +-1%	RME0693	1
R373	R,METAL	1W 68	OHM +-5%	RMR2769	1
R374	R,METAL	1/4W 82.5	OHM +-1%	RME0651	1
R375	R,METAL	1/4W 47.5	OHM +-1%	RME0648	1
R376	R,METAL	1W 68	OHM +-5%	RMR2769	1
R380	R,CARBON	1/4W 10	KOHM +-5%	RCR3076	1
R381	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R382	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R383	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R384	R,CARBON	1/4W 150	OHM +-5%	RCR3032	1
R385	R,CARBON	1/4W 100	OHM +-5%	RCR3028	1
R386	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R387	R,CARBON	1/4W 47	OHM +-5%	RCR3020	1
R389	R,METAL	5 W 390	OHM +-5%	RMR3257	1
R390	R,METAL	5 W 390	OHM +-5%	RMR3257	1
R391	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R1034	R,CARBON	1/4W 100	KOHM +-5%	RCR3100	1
R1035	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R1036	R,CARBON	1/4W 6.8	KOHM +-5%	RCR3072	1
R1037	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
RT324	THERMISTOR	TMD1410H		H 8360551	1
RT345	THERMISTOR	TMD1410H		H 8360551	1
RV325	VR,METAL	CR19R B 100	OHM	RNC0005	1
RV327	VR,METAL	CR19R B 220	OHM	RNC0030	1
RV339	VR,METAL	CR19R B 1	OHM	RNC0003	1
RV1035	VR,METAL	CR19R B 100	KOHM	RNC0012	1
RV1038	VR,METAL	CR19R B 100	KOHM	RNC0012	1
TR321	TRANSISTOR	2SA800		HTA0108	1
TR322	TRANSISTOR	2SA800		HTA0108	1

Simbol	Description	Code	Q'ty
TR329	TRANSISTOR 2SC1906	HTC0338	1
TR330	TRANSISTOR 2SC1906	HTC0338	1
TR337	TRANSISTOR 2SC1747	HTC0496	1
TR338	TRANSISTOR 2SC1747	HTC0496	1
TR353	TRANSISTOR 2SC1747	HTC0496	1
TR355	TRANSISTOR 2SC1747	HTC0496	1
TR361	TRANSISTOR 2SC1252	HTC0064	1
TR362	TRANSISTOR 2SC1252	HTC0064	1
TR383	TRANSISTOR 2SC1252	HTC0064	1
TR386	TRANSISTOR 2SC1252	HTC0064	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-499)

Simbol	Description				Code	Q'ty
C801	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C803	C,CERAMIC	50	V 2200	PF+80%-20%	CCC1205	1
C811	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C814	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1
C824	C,AL ELYC	25	V 10	UF	CEC0175	1
C825	C,CERAMIC	500	V 0.5	PF+-0.25PF	CCC0111	1
C826	C,CERAMIC	500	V 0.5	PF+-0.25PF	CCC0111	1
C831	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C832	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C833	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C843	C,CERAMIC	500	V10000	PF+-10%	CCD0218	1
C845	C,CERAMIC	50	V 68	PF+-5%	CCC1034	1
C846	C,CERAMIC	50	V 68	PF+-5%	CCC1034	1
C891	C,AL ELYC	25	V 10	UF	CEC0175	1
C1104	C,PLASTIC	50	V10000	PF+-10%	CQA0097	1
C1105	C,AL ELYC	160	V 10	UF	CEC0214	1
C1106	C,PLASTIC	50	V10000	PF+-10%	CQA0097	1
C1110	C,AL ELYC	100	V 220	UF	CEC0211	1
C1111	C,AL ELYC	25	V 2200	UF	CEC0347	1
C1112	C,CERAMIC	50	V 220	PF+-10%	CCC1027	1
C1113	C,AL ELYC	16	V 47	UF	CEC0170	1
C1116	C,AL ELYC	16	V 47	UF	CEC0170	1
C1121	C,AL ELYC	25	V 2200	UF	CEC0347	1
C1124	C,AL ELYC	16	V 47	UF	CEC0170	1
C1131	C,AL ELYC	25	V 2200	UF	CEC0347	1
C1132	C,AL ELYC	16	V 47	UF	CEC0170	1
C1142	C,PLASTIX	50	V 0.1	UF+-10%	CQA0103	1
C1151	C,AL ELYC	100	V 220	UF	CEC0211	1

Simbol	Description	Code	Q'ty
C1156	C,AL ELYC 160 V 10 UF	CEC0214	1
C1161	C,AL ELYC 25 V 1000 UF	CEC0178	1
D832	DIODE HZ5B T-D	HDH0029	1
D1101	DIODE M4C-1	HDM0033	1
D1103	DIODE 1S2075 T-D	HDS0108	1
D1104	DIODE 1S2075 T-D	HDS0108	1
D1105	DIODE V06C	HDV0019	1
D1111	DIODE M4C-1	HDM0033	1
D1114	DIODE V06C	HDV0019	1
D1117	DIODE HZ7BT-D	HDH0040	1
D1124	DIODE V06C	HDV0019	1
D1131	DIODE M4C-1	HDM0033	1
D1151	DIODE V06C	HDV0019	1
D1152	DIODE HZ22	HDH0072	1
D1153	DIODE HZ22	HDH0072	1
D1155	DIODE 1S2075 T-D	HDS0108	1
D1156	DIODE V06C	HDV0019	1
D1161	DIODE V06C	HDV0019	1
D1162	DIODE V06C	HDV0019	1
F1161	FUSE MF61NM 1 (1A 250V)JIS	EFG0344	1
IC1104	ANALOG IC HA17458GS	ILH0054	1
IC1111	ANALOG IC HA17723G	ILH0019	1
IC1121	IC FS-7912	HX8338437	1
IC1131	IC HA17805P	HX8338426	1
J839	PIN FOR CONNECTOR	HX8193940	1
J840	PIN FOR CONNECTOR	HX8193940	1
P801	CONNECTOR 171825-4	JBX0704	1
P811	CONNECTOR 171825-6	JBX0470	1
P1101	CONNECTOR 1-171825-0	JBX0703	1
P1104	CONNECTOR 171825-6	JBX0470	1

Simbol	Description			Code	Q'ty
P1105	CONNECTOR	171825-6		JBX0470	1
P1106	CONNECTOR	171825-6		JBX0470	1
P1107	CONNECTOR	1-171825-0		JBX0703	1
P1191	CONNECTOR	171825-6		JBX0470	1
P1192	CONNECTOR	171825-3		JBX0468	1
PEF499	PCB	PEF-499		H 116458	1
R801	R,METAL	1/4W	12.1 KOHM +-1%	RME0677	1
R802	R,METAL	1/4W	12.1 KOHM +-1%	RME0677	1
R803	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1
R804	R,CARBON	1/4W	68 OHM +-5%	RCR3024	1
R811	R,METAL	1/4W	10.0 KOHM +-1%	RME0676	1
R812	R,METAL	1/4W	10.0 KOHM +-1%	RME0676	1
R813	R,METAL	1/4W	909 OHM +-1%	RME0714	1
R814	R,CARBON	1/4W	220 KOHM +-5%	RCR3102	1
R820	R,CARBON	1/4W	220 OHM +-5%	RCR3036	1
R821	R,METAL	1/4W	1.21 KOHM +-1%	RME0665	1
R822	R,METAL	1/4W	1.21 KOHM +-1%	RME0665	1
R823	R,CARBON	1/4W	10 KOHM +-5%	RCR3076	1
R824	R,CARBON	1/4W	33 OHM +-5%	RCR3016	1
R825	R,METAL	2 W	10 KOHM +-5%	RMR2805	1
R826	R,METAL	2 W	10 KOHM +-5%	RMR2805	1
R827	R,CARBON	1/4W	68 OHM +-5%	RCR3024	1
R828	R,CARBON	1/4W	68 OHM +-5%	RCR3024	1
R829	R,CARBON	1/4W	1.0 KOHM +-5%	RCR3052	1
R830	R,CARBON	1/4W	1.0 KOHM +-5%	RCR3052	1
R831	R,CARBON	1/4W	47 KOHM +-5%	RCR3092	1
R832	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1
R833	R,METAL	1/4W	392 OHM +-1%	RME0659	1
R834	R,METAL	1/4W	392 OHM +-1%	RME0659	1
R835	R,CARBON	1/4W	2.2 KOHM +-5%	RCR3060	1

Simbol	Description				Code	Q'ty
R837	R,METAL	2 W	10	KOHM +-5%	RMR2805	1
R838	R,METAL	2 W	10	KOHM +-5%	RMR2805	1
R839	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R840	R,CARBON	1/4W	330	OHM +-5%	RCR3040	1
R844	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R845	R,CARBON	1/4W	100	OHM +-5%	RCR3028	1
R891	R,CARBON	1/4W	220	OHM +-5%	RCR3036	1
R1101	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R1102	R,CARBON	1/4W	15	KOHM +-5%	RCR3080	1
R1103	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R1104	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R1105	R,METAL	1/4W	56.2	KOHM +-1%	RME0685	1
R1106	R,METAL	1/4W	12.1	KOHM +-1%	RME0677	1
R1107	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
R1111	R,SOLID	M-2	0.47	OHM +-5%	RWM0146	1
R1112	R,METAL	1/4W	3.92	KOHM +-1%	RME0671	1
R1113	R,METAL	1/4W	6.19	KOHM +-1%	RME0729	1
R1115	R,METAL	1/4W	10.0	KOHM +-1%	RME0676	1
R1116	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R1117	R,CARBON	1/2W	4.7	KOHM +-5%	RCR3175	1
R1125	R,METAL	1/4W	10.0	KOHM +-1%	RME0676	1
R1191	R,CARBON	1/4W	1.0	KOHM +-5%	RCR3052	1
R1142	R,CARBON	1/4W	470	KOHM +-5%	RCR3104	1
R1143	R,CARBON	1/4W	4.7	OHM +-5%	RCR3068	1
R1151	R,CARBON	1/4W	10	OHM +-5%	RCR3004	1
R1152	R,CARBON	1/4W	10	KOHM +-5%	RCR3076	1
RV804	VR,METAL	CR19R B	100	OHM	H RNC0005	1

Simbol	Description	Code	Q'ty
RV811	VR,METAL CR19R B 4.7 KOHM	H RNC0031	1
RV813	VR,METAL CR19R B 470 OHM	H RNC0002	1
RV1112	VR,METAL CR19R B 1 KOHM	RNC0003	1
TR801	TRANSISTOR 2SA781K	HTA0099	1
TR802	TRANSISTOR 2SA781K	HTA0099	1
TR811	TRANSISTOR 2SA781K	HTA0099	1
TR812	TRANSISTOR 2SA781K	HTA0099	1
TR825	TRANSISTOR 2SC1906	HTC0338	1
TR828	TRANSISTOR 2SC1906	HTC0338	1
TR831	TRANSISTOR 2SD668A-C	HTD0100	1
TR832	TRANSISTOR 2SD668A-C	HTD0100	1
TR833	TRANSISTOR 2SB648A-C	HTB0087	1
TR834	TRANSISTOR 2SB648A-C	HTB0087	1
TR836	TRANSISTOR 2SC1906	HTC0338	1
TR837	TRANSISTOR 2SC1906	HTC0338	1
TR1101	TRANSISTOR 2SD478C	HTD0053	1
TR1102	TRANSISTOR 2SD478C	HTD0053	1
TR1111	TRANSISTOR 2SD478C	HTD0053	1
TR1151	TRANSISTOR 2SD478C	HTD0053	1
TR1191	TRANSISTOR 2SC458C	HTC0148	1
TR1192	TRANSISTOR 2SC1061C	HTC0032	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-500)

Simbol	Description	Code	Q'ty
C1201	C,AL ELYC 16 V 47 MF	CEC0170	1
C1202	C,CERAMIC 50 V10000 PF+80%-20%	CCC1030	1
C1203	C,PLASTIC 50 V22000 PF+-10%	CQA0099	1
C1205	C,CERAMIC 50 V 220 PF+-10%	CCC1027	1
C1206	C,CERAMIC 50 V 100 PF+-10%	CCC1025	1
C1209	C,AL ELYC 16 V 47 MF	CEC0170	1
C1303	C,AL ELYC 25 V 10 MF	CEC0175	1
C1304	C,AL ELYC 25 V 10 MF	CEC0175	1
D1301	DIODE HZ7BT-D	HDH0040	1
D1302	DIODE HZ7BT-D	HDH0040	1
D1303	DIODE 1S2075 T-D	HDS0108	1
D1304	DIODE 1S2075 T-D	HDS0108	1
D1401	DIODE SR503D WITH MOUNT (RED)	HDS0408	1
IC1201	IC HA17555GS	ILH0063	1
IC1202	DIGITAL IC MC14011BCP	IDM0169	1
L1208	COIL FL-5H 330K	TLF0019	1
P1201	CONNECTOR 171826-3	JBX1710	1
P1202	CONNECTOR 171825-3	JBX0468	1
P1203			
P1302	CONNECTOR 171826-3	JBX1710	1
P1303	CONNECTOR 171826-6	JBX1711	1
PEF-500	PCB PEF-499	H 116458	R
R1201	R,CARBON 1/4W 10 KOHM +-5%	RCR3076	1
R1202	R,CARBON 1/4W 22 OHM +-5%	RCR3012	1
R1203	R,METAL 1/4W 6.81 KOHM +-1%	RME0674	1
R1204	R,METAL 1/4W 22.1 KOHM +-1%	RME0680	1
R1205	R,METAL 1/4W 10.0 KOHM +-1%	RME0676	1
R1206	R,METAL 1/4W 475 OHM +-1%	RME0660	1
R1207	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
R1208	R,CARBON 1/4W 22 OHM +-5%	RCR3012	1

Simbol	Description	Code	Q'ty
R1209	R,CARBON 1/4W 22 KOHM +-5%	RCR3084	1
R1302	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
R1303	R,CARBON 1/4W 4.7 KOHM +-5%	RCR3068	1
R1304	R,CARBON 1/4W 4.7 KOHM +-5%	RCR3068	1
R1401	R,CARBON 1/4W 1.0 KOHM +-5%	RCR3052	1
RV1203	VR,METAL CR29R 10 KOHM	HX8348450	1
RV1205	VR,METAL CR29R 2.2 KOHM	HX8348450	1
RV1301	VR,CARBON 1/2W 2×10KOHM+-20%(DPST)	HX3159314	1
RV1302	VR,CARBON TYPE 10KB+10KB	HX3142092	1
RV1303	VR,CARBON TYPE 10KB+10KB	HX3142092	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-501)

Simbol	Description		Code	Q'ty
P547	CONNECTOR	171826-3	JBX1710	1
P562	CONNECTOR	1-171826-2	JBX1713	1
PEF501	PCB	PEF-495	H 116456	R
R880	R,CARBON	1/4W 100 OHM +-5%	RCR3028	1
R881	R,CARBON	1/4W 15 KOHM +-5%	RCR3080	1
R882	R,CARBON	1/4W 100 OHM +-5%	RCR3028	1
RV298	VR,CARBON	EWK-ENAP20B14 (10K+10K)	H 3159318	1
RV552	VR,CARBON	TYPE 16 10KB+50KB WITH/SW	HX3142080	1
S357	SW,PUSH	UEG22-2	HX8311793	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-502)

Simbol	Description			Code	Q'ty
PL1401	LAMP	SCALE	14V 80MA	HX8329332	1
PL1402	LAMP	SCALE	14V 80MA	HX8329332	1
PL1403	LAMP	SCALE	14V 80MA	HX8329332	1
PEF502	PCB	PEF-499		H 116458	R

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-503)

Simbol	Description	Code	Q'ty
C1030	C,CERAMIC 50 V 100 PF+-10%	CCC1025	1
J1011	SOCKET PS-085	JSP0001	1
PEF-503	PCB PEF-499	H 116458	R
R1030	R,CARBON 1/4W 4.7 KOHM +-5%	RCR3068	1
R1031	R,CARBON 1/4W 100 KOHM +-5%	RCR3100	1
R1033	R,CARBON 1/4W 100 OHM +-5%	RCR3028	1
R1035	R,CARBON 1/4W 100 OHM +-5%	RCR3028	1

ELECTRICAL REPLACEABLE PARTS LIST
CIRCUIT BOARD (PEF-504)

Simbol	Description	Code	Q'ty
C905	C,CERAMIC 500 V 0.5 PF+-0.25PF	CCC0111	1
C906	C,CERAMIC 50 V 15 PF+-5%	CCC1004	1
C910	C,AL ELYC 25 V 10 MF	CEC0175	1
C912	C,CERAMIC 500 V10000 PF+-10%	CCD0218	1
C913	C,CERAMIC 500 V10000 PF+-10%	CCD0218	1
C914	C,CERAMIC 50 V 220 PF+-10%	CCC1027	1
C1001	C,PLASTIC 50 V47000 PF+-10%	CQA0101	1
C1006	C,PLASTIC 50 V47000 PF+-10%	CQA0101	1
C1010	C,CERAMIC 500 V 1000 PF+-10%	CCD0217	1
C1011	C,CERAMIC 2000 V 4700 PF+-10%	CCD0221	1
C1012	C,CERAMIC 2000 V 4700 PF+-10%	CCD0221	1
C1013	C,AL ELYC 160 V 1 UF	CEC0213	1
C1020	C,CERAMIC 2000 V 4700 PF+-10%	CCD0221	1
C1021	C,CERAMIC 2000 V 4700 PF+-10%	CCD0221	1
C1028	C,CERAMIC 500 V10000 PF+-10%	CCD0218	1
C1031	C,CERAMIC 2000 V 100 PF+-10%	CCC1207	1
C1161	C,AL ELYC 25 V 100 UF	CEC0177	1
D903	DIODE 1SS88	HDS0415	1
D904	DIODE 1S2075 T-D	HDS0108	1
D911	DIODE 1S2075 T-D	HDS0108	1
D1001	DIODE 1S2075 T-D	HDS0108	1
D1010	DIODE 1SS83	HDS0250	1
D1011	DIODE 1SS83	HDS0250	1
D1012	DIODE 1SS83	HDS0250	1
D1020	DIODE Y10GA	HDY0031	1
D1021	DIODE 1SS83	HDS0250	1
D1028	DIODE Y10GA	HDY0031	1
D1040	DIODE HZ22	HDH0072	1
IC1001	IC,ANALOG TL071CP	ILT0041	1
MUT1001	MULTIPLIER 17KV W/ANODE CAP	H 3142144	1

Simbol	Description			Code	Q'ty
NL1031	LAMP	NE-2		ELL0019	1
NL1032	LAMP	NE-2		ELL0019	1
P901	CONNECTOR	171825-3		JBX0468	1
P902	CONNECTOR	171825-3		JBX0468	1
P1001	CONNECTOR	1-171825-0		JBX0703	1
P1002	CONNECTOR	171825-3		JBX0468	1
P1021	CONNECTOR	171825-3		JBX0468	1
P1022	CONNECTOR	171825-3		JBX0468	1
P1023	CONNECTOR	171825-3		JBX0468	1
P1401	CONNECTOR	171825-3		JBX0468	1
PEF-504	PCB	PEF-499		H 116458	R
PEF531	PCB	PEF-499		H 116458	R
R901	R,CARBON	1/4W	3.3 KOHM +-5%	RCR3064	1
R902	R,CARBON	1/4W	15 KOHM +-5%	RCR3080	1
R903	R,METAL	1/4W	2.21 KOHM +-1%	RME0668	1
R904	R,METAL	1/4W	15.0 KOHM +-1%	RME0678	1
R905	R,METAL	1 W	15 KOHM +-5%	RMR2783	1
R906	R,CARBON	1/4W	3.3 KOHM +-5%	RCR3064	1
R907	R,CARBON	1/4W	100 KOHM +-5%	RCR3100	1
R908	R,CARBON	1/4W	1.0 KOHM +-5%	RCR3052	1
R909	R,CARBON	1/4W	47 OHM +-5%	RCR3020	1
R910	R,CARBON	1/4W	68 KOHM +-5%	RCR3096	1
R911	R,CARBON	1/4W	12 KOHM +-5%	RCR3078	1
R912	R,METAL	1/4W	1.00 KOHM +-1%	RME0664	1
R913	R,METAL	1 W	15 KOHM +-5%	RMR2783	1
R915	R,CARBON	1/4W	220 OHM +-5%	RCR3036	1
R916	R,METAL	1/4W	6.81 KOHM +-1%	RME0674	1
R917	R,CARBON	1/4W	10 OHM +-5%	RCR3004	1
R918	R,CARBON	1/4W	470 OHM +-5%	RCR3044	1
R919	R.CARBON	1/4W	100 OHM +-5%	RCR3028	1

Simbol	Description			Code	Q'ty
R920	R,CARBON	1/4W 82	KOHM +-5%	RCR3098	1
R921	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R1001	R,METAL	1/4W 619	KOHM +-1%	RME0825	1
R1002	R,CARBON	1/4W 3.3	KOHM +-5%	RCR3064	1
R1003	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R1004	R,CARBON	1/4W 100	KOHM +-5%	RCR3100	1
R1005	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R1006	R,CARBON	1/4W 10	OHM +-5%	RCR3004	1
R1010	R,CARBON	1/4W 330	KOHM +-5%	RCR3103	1
R1011	R,CARBON	1/4W 220	OHM +-5%	RCR3036	1
R1012	R,CARBON	1/4W 33	OHM +-5%	RCR3016	1
R1020	R,CARBON	1/4W 4.7	KOHM +-5%	RCR3068	1
R1021	R,SOLID	1/4W 10	MOHM +-5%	RSE0434	1
R1022	R,CARBON	1/2W 2.7	MOHM +-5%	RCR3480	1
R1023	R,CARBON	1/2W 2.7	MOHM +-5%	RCR3480	1
R1024	R,CARBON	1/2W 2.7	MOHM +-5%	RCR3480	1
R1025	R,CARBON	1/2W 2.7	MOHM +-5%	RCR3480	1
R1027	R,CARBON	1/4W 1	MOHM +-5%	RCR3106	1
R1028	R,CARBON	1/4W 1.0	KOHM +-5%	RCR3052	1
R1031	R,METAL	1 W 22	MOHM +-1%	HX3142076	1
RV1040	VR,METAL	CR29R 100	KOHM	HX8348450	1
T1001	XFMR	HIGH VOLTAGE XFMR FOR V1050		H 3142143	1
TR903	TRANSISTOR	2SC641K-C		HTC0192	1
TR909	TRANSISTOR	2SC1906		HTC0338	1
TR911	TRANSISTOR	2SB648A-C		HTB0087	1
TR912	TRANSISTOR	2SD668A-C		HTD0100	1
TR920	TRANSISTOR	2SA778AK		HTA0104	1
TR921	TRANSISTOR	2SA781K		HTA0099	1
TR1006	TRANSISTOR	2SC1061C		HTC0032	1

ELECTRICAL REPLACEABLE PARTS LIST
CABINET

Simbol	Description		Code	Q'ty
F1401	FUSE	MF61NM 2 (2A 250 V)JIS	EFG0352	1
FH1401	TERMINAL	S-17221 (100/120/220/240V)	HX3142147	1
L1401	COIL	V-550	HX3142116	1
J1410	CONNECTOR	CM3 (C-170)	JJC0026	1
RV551	VR,WIRE	MF220D 2KOHM	RXM0009	1
RV1401	VR,CARBON	EVM-R7GS20B26	RDE0028	1
TP1401	TERMINAL	BLK	HX4114183	1
TP1402	TERMINAL	Z-048	HX8338351	1
T1401	XFMR	POWER XFMR FOR V-1050	H 3159329	1
V1401	CRT	150BNB31	H 3159317	1

MECHANICAL REPLACEABLE PARTS LIST

Symbol	Description	Code	Q'ty	Remarks
1	Cover	288054-A	1	
2	Cover, bottom	3149269-A	1	
3	Chassis, front	117473-AA	1	
4	Chassis, rear	294969-AA	1	
5	Chassis	294970-A	1	
6	Angle	3149270-A	1	
7	Angle	3149271-AA	1	
8	Angle	3159618-AA	1	
9	Angle	3149273-AA	1	
11	CRT band	3159619-A	2	
12	Plate, shield	3159620-A	1	
13	Bracket, support	8338296-A	1	
14	Bracket, PEF498	8353484-A	1	
15	Bracket, PEF499	3159621-A	1	
16	Bracket	8330677-A	1	
17	Plate, shield	8330678-A	1	
18	Bracket, LSW	3159622-A	1	
19	Bracket, LSW	8353485-A	1	
20	Bracket, LSW	8353486-A	1	
21	Plate, shield	8338330-A	1	
22	HV case	8353487-AA	1	
23	Plate	8330684-A	1	
24	Plate	3149278-A	2	
26	Plate, shield	8364165-A	1	
27	Plate, earth	8360706-A	2	
28	Bracket, MD	8345458-A	1	
29	Heat sink	8355595-A	1	
30	Chassis, PEF504	8353489-A	1	
32	Spacer, BNC	8360673-A	2	
41	Screw Plate	8345476-A	2	

Symbol	Description	Code	Q'ty	Remarks
51	Shield band	8316268-B	1	
52	Shield case	3159625-A	1	
53	Handle	3156107-A	1	
54	Lock, handle	8345467-A	2	
56	Panel, front	294971-B	1	
57	Panel, rear	3159623~24-A	1	
59	Bezel	288060-A	1	
60	Cover, side	3149315-A	2	
62	Foot, rear	3149317-A	4	
63	Foot	3140755-A	4	
64	Bush	ERR0073	1	B-312-250
65	Spacer	Xci0097	2	PS-4N(6.4H)
66	Filter	3149318-A	1	
67	Plate	8353491-A	1	
68	Plate	8364166-A	1	
69	Rubber	8322428-B	1	
71	Cushion	8330711-B	2	
72	Cushion	8330711-F	1	
73	Knob	3149319-A	1	AT
74	Knob	3149320-A	1	BT
75	Knob	3149321-A	6	S18
76	Knob	3149322-B	1	S24
77	Knob	3149323-A	2	URV
78	Knob	3149324-A	4	S18B
79	Knob	3122685-D	2	0022
80	Knob	3149325-B	6	LSW
81	Knob	3149324-B	1	S18B-N
82	Label	8316162-A	1	SER.No.
83	Rivet	8340163-B	4	No.1027
84	Rivet	8340164-A	4	No.113

Symbol	Description	Code	Q'ty	Remarks
85	Support	8360723-A	10	LCBS-3NS
86	Support	8360723-G	4	LCBS-14NS
87	Bush	8340166-A	1	CE-012
88	Bush	ERR0010	1	CSG-012
91	Knob	8353492-A	1	P
92	Rubber	8353493-A	1	
93	Rubber	8353494-A	2	
94	Band	8353501-G	1	
95	Guide, cable	8353502-A	2	No.249
96	Guide, cable	8353502-B	1	No.1219
98	Label, HV caution	849085	1	
301	Screw, sems (Sw·w)	XCA0661	14	M3 × 8
302	Screw, sems (Sw)	XCA1319	6	M4 × 12
303	Screw, sems (Sw·w)	8340167-C	4	M4 × 20
306	Screw	XCA6205	7	M2 × 5
307	Screw	XCA6306	6	M3 × 6
308	Screw	XCA6308	27	M3 × 8
309	Screw	XCA6312	9	M3 × 12
311	Screw	XCA6410	4	M4 × 10
313	Screw, black	XCA1820	4	M3 × 10
318	Screw	XCA0782	4	M2.6 × 4
316	Screw, flat	XCA7306	28	M3 × 6
401	Washer, spring	XCA1879	8	M3
402	Washer, spring	XCA1881	2	M4
403	Washer	XCA1855	8	M3
404	Washer	XCA1857	2	M4
405	Nut	XCA1706	8	M3
406	Nut	XCA1707	2	M4

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